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This report of the Stanford Center for Research and Development in Teaching consists of seven sections. Section 1 defines the Center's focus and orientation. Orientation to forthcoming changes in the teacher's role includes consideration of programed instruction, flexible scheduling, and differentiated teaching staff. The focus of the Center is reformulated to consider three types of variables: the behavioral ("the observable, objectively denotable, verbal and nonverbal behavior that occurs in the interaction of teachers and students in the classroom"), the personological ("the traits and characteristics of teachers that intervene between variables at the institutional level"), and the institutional ("phenomena and events that occur in the society at large, the community, school system, and the individual school"). Section 2, "Program Summary and Projection," delineates each of these major problem areas by describing existing projects and projecting plans for years immediately ahead. Section 3 concentrates on "Facilities and Services" and Section 4 on "Center Management and Administration." Section 5, the budget, is not included because it was submitted separately. Sections 6 and 7 present "Requests for Contract Amendments" and "Signatures." Appended are guidelines for Center organization and operation, a list of personnel, and a chart of the Center's organization. (SG)

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Stanford Center for Research and Development in Teaching

First Annual Report

April 1967

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
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STANFORD CENTER FOR RESEARCH AND DEVELOPMENT IN TEACHING
FIRST ANNUAL REPORT, APRIL 1967

I. Focus

The Stanford Center for Research and Development in Teaching continues to focus on the behavior and characteristics of teachers. Variables in this domain serve as (a) dependent variables in relation to teacher education programs and procedures, and as (b) independent variables in relation to pupils' behaviors and learnings, i.e., effects on pupils. Section II, Program Summary and Projection, reports on the programs and projects in teacher education and teacher effects. This section defines the Center's focus and orientation.

A. Orientation to Forthcoming Changes in the Teacher's Role

The Center must orient itself to educational movements that may radically change the role of the teacher in the next few decades. These changes are likely to result in new administrative, organizational, and instructional arrangements in schools. Specifically, the Center is concerned with ways in which the teacher's role will be changed by such developments as programmed instruction, flexible scheduling, and differentiation of the teaching staff.

1. Programmed Instruction. Programmed instruction refers to teaching in which (a) objectives are specified in behavioral terms and analyzed into their component behaviors, (b) the relevant characteristics of the learners are specified in the form of "entering behaviors," (c) evidence of interim and final success of the instruction is operationally defined, (d) instructional environments are created to elicit and reinforce desirable behaviors in planned sequences, and (e) feedback on the consequences of the instruction is provided for both the learner and the teacher. As Dale* has pointed out, many of the features of programmed instruction defined in this general sense have a long history. Highly detailed lessons, systematic arrangement of instruction, analyses of instructional outcomes, sequenced behaviors, instructional materials

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* Edgar Dale, "Historical Setting of Programmed Instruction" in Phil C. Lange (ed.) Programmed Instruction: The 66th Yearbook of the National Society for the Study of Education, Part II, 1967. Pages 28-54.

designed to systematize activities for learning, independent learning and self-instruction with self-corrective practice materials, and graded serial learning tasks -- all these can be found at one point or another since the time of Plato. Programmed instruction defined in this way consists of computer-assisted instruction, programmed textbooks, or "Individually Prescribed Instruction" as developed by the Learning Research and Development Center at the University of Pittsburgh. The latest NSSE Yearbook, _Programmed Instruction_, supports the expectation that the movement toward programmed instruction will extend through all levels of education in the years ahead, and inevitably affect the teacher's role.

In taking account of programmed instruction, one should note Suppes' distinctions* among three levels of interaction between the student and the programmed instructional material: (a) drill-and-practice, (b) tutoring, and (c) dialogue. Drill-and-practice is already feasible and is now being implemented. In tutorial systems, "the aim is to take over from the classroom teacher the main responsibility for instruction..." One problem in tutorial instruction is that of allowing for constructive responses that are not unique, that is, where more than one answer may be considered correct. As Suppes states,

> "... well-structured subjects such as reading and mathematics can easily be handled by tutorial systems... It should be emphasized, however, that no tutorial program designed in the near future will be able to handle every kind of problem that arises in student learning. It will remain the teacher's responsibility to attempt the challenging task of helping students who are not proceeding successfully with the tutorial program and who need special attention... Not only will the tutorial program itself be aimed at individualized instruction, but also it will free the teacher from many classroom responsibilities so that he will have time to individualize his own instructional efforts."
> (Suppes, 1966, p. 218).

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* Patrick Suppes, "The Uses of Computers in Education" _Scientific American_, 1966, 215, 207-220.

Dialogue systems, requiring programs that will recognize and provide answers to broad and complex questions, and computer programs that will be able to recognize the student's spoken word, seem at present to lie in the indefinite future.

As programmed instruction develops, what new tasks and role will teachers need to perform? At present, it is possible to identify the following tasks of teachers that may become more prominent:

(a) The task of directing student behaviors that occur in complex, multi-track patterns. Such behaviors occur when a student writes a paper, gives a talk, helps put on a play, or carries out a research project.

(b) The task of making extemporaneous remedial explanations. Occasions will always arise when it is most convenient to clear up an intellectual problem by having the teacher "explain" a concept or principle by means of extemporaneous, oral, verbal discourse.

(c) The task of teaching in small groups. Some objectives can best be obtained by students in interaction with other students and their teacher. Examples of such objectives are those of learning to deal with controversial issues in group discussion, learning to understand views in disagreement with one's own, learning to solve problems in the heat of social interaction.

(d) The task of providing a model of appropriate thought and action. For many important educational objectives -- motor, intellectual, and social skills -- learning is best promoted by providing a model of mature performance of the kind that a teacher can exhibit.

2. Flexible Scheduling. Organizing the school day into periods of varying length, adjusted according to subject matter needs, the interests of individual students, and the requirements of various forms of instruction, is known as flexible scheduling. As described

by Bush amd Allen*, such flexible scheduling, arranged by means of high speed computers, can help solve the complex problem of differentiating the curriculum, materials, periods of teaching, staff functions, and class sizes in accordance with relevant differences in the needs, abilities, and interests of individual students. The proposed design for high school education stipulates that any subject should properly be taught by all four of the following approaches: large-group instruction, small-group instruction, independent-individual instruction, and special laboratory instruction. The corresponding variations in the roles of teachers should be taken into account in the Center's program of research and development.

As of today, attempts to develop and install flexible scheduling are underway in about 100 high schools located in 20 states. A project entitled "The Stanford School Scheduling System" supported by each individual school district and renewable by contract each year is underway under the direction of Professor Dwight Allen. It seems fair to say, on the basis of current experience, that flexible scheduling will be adopted ever more widely in the decades ahead. Its implications for changes in the teacher's role and corresponding changes in patterns of teacher education and research on teacher effects should be taken into account in planning the Center's program. Accordingly, in the subsequent sections of this report, an attempt has been made to formulate research and development projects that reflect adequate recognition of the implications of flexible scheduling.

3. The Differentiated Teaching Staff. In the vast majority of schools, both elementary and secondary, the teaching staff is now undifferentiated. That is, most teachers have highly similar duties and responsibilities with respect to teaching, coordination with other teachers, and planning of instruction. Differences among teachers in experience, training, and abilities are disregarded for the most part in the organization of the typical school.

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* Robert N. Bush and Dwight W. Allen, A New Design for High School Education Assuming a Flexible Schedule. New York: McGraw-Hill, 1964.

This lack of differentiation has serious consequences for the career of the teacher, his morale and, most important, the instructional and educational program. Opportunities for mobility within the teaching profession are limited; differences in teachers' salaries and opportunity to exercise influence over the educational program can exist to only a relatively small degree. Little advantage can be taken of the special abilities for different kinds of instruction and leadership that may exist within the teaching staff. The potentialities of flexible scheduling for adjusting the school program to differences in the nature of various disciplines, student needs and abilities, and teacher qualifications cannot be realized with non-differentiated teaching staff.

Recently, proposals for a differentiated teaching staff have been made.* In these proposals, teachers are differentiated in terms of title, salary, qualifications, and responsibilities. At the lowest level, the "associate teacher" with only a bachelor's degree deals only with his own class, leads discussions, and makes daily plans and evaluations for his students. At the next higher level, the "staff teacher" makes maximum use of his own particular specialty, performs diagnosis and routine remedial teaching, conducts in-service training programs for associate teachers, teaches classes of different ability levels, supervises associate teachers in weekly planning sessions, and engages in general course planning.

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* Dwight W. Allen, "A Differentiated Teaching Staff" Stanford, California: Stanford Center for Research and Development in Teaching, Research Memorandum #6, 1967, 11 pp. mimeographed.

Temple City Unified School District, The Temple City Differentiated Staffing Project: A Project Proposal to the Kettering Foundation. Temple City, California: The Temple City Unified School District, August 1966, 3 pp. mimeographed.

Garda W. Bowman and Gordon J. Klopf, "Auxiliary School Personnel: Their Roles, Training, and Utilization, New York: Bank Street College of Education, 1966. 12 pp.

At the third level, the "senior teacher" engages in large-group instruction, teaches pilot programs, coordinates his department and various pilot programs, and leads in the planning of units and departmental innovations. At the highest level, the "curriculum associate" takes charge of the teaching of large groups, may act as a specialist in remediation, develops innovations to meet anticipated needs, coordinates the work of groups of senior teachers, works with student advisory groups, plans special programs for exceptional students and leads in the formulation of overall school and curriculum goals.

The details of these proposals may not survive in the efforts now being made to put the idea of a differentiated teaching staff into effect in an actual school system. But the general problem to which these proposals are addressed is important, and the rationale of these plans is promising. Hence the Center's program should be oriented to the possibility that the teacher's role will be differentiated in these ways in the not too distant future. In combination with flexible scheduling, the conception of the differentiated teaching staff has implications for a thoroughgoing re-formulation of the teacher's role. This reformulation will affect teacher education, the organizational context of teaching, and the classroom behaviors of teachers in ways that should not be disregarded in the Center's program of research and development.

* * *

In this section, three different developments affecting the teacher's role have been sketched: flexible scheduling, the differentiated teaching staff, and programmed instruction. Among other significant developments that will affect the teacher's role are changes in the curriculum, such as the "new" mathematics, science, English, and social studies; team teaching; new instructional media, such as television, language laboratories, and videotape recorders; new learning environments, such as individual learning carrels, and operable school walls. Suffice it to say at this point that the Center is engaged in a continuing study, in the project described below entitled "The Teacher in 1980," of the implications of these developments for the teacher's role and the Center's program.

B. A Reformulation of the Center's Domain.

In the original formulation of the Center's focus, "research on teaching" was defined as including research on teacher education and research on teacher effects, as already indicated. In the foregoing section, an attempt has been made to consider the consequences of new educational developments that indicate the need for a more explicit formulation of the Center's domain.

This reformulation deals with the types of variables with which the Center's research and development programs will be concerned. In brief, these types of variables are termed the behavioral, the personological, and the institutional. These terms denote events that occur at increasing "distances", respectively, from the point of impact of the teacher on his students in the classroom. The behavioral level consists in the observable, objectively denotable, verbal and non-verbal behavior that occurs in the interaction of teachers and students in the classroom. The personological level deals with the traits and characteristics of teachers that intervene between variables at the institutional level and the teacher's classroom behaviors. The institutional level embraces phenomena and events that occur in the society at large, the community, school system, and the individual school.

The classification of variables in terms of their conceptual distance from teaching in the classroom produces a chain of classes of variables. The first domain consists in the behavior that teachers and students exhibit in their face-to-face interaction in the classroom. Examples of current projects here are those concerned with the various technical skills of teaching, described below.

The second domain, the personological, refers to the teacher characteristics and traits, or the teacher's personality, which is molded by the institutional definors and social and technological conditions, and which influences in turn the kinds of teaching acts exhibited in the classroom. Current projects in this area are those dealing with teacher attitudes, particularly those related to the general dimension of "warmth," described below.

The third domain, institutional, embraces events with which the person is not in direct contact and over which he does not exercise immediate control. Examples of categories of variables in this domain are the organizational climate of the school, student subcultures, and the roles of teachers as determined by the expectations that teachers must meet and teacher education programs inculcate. Current programs of the Center that fall in this domain are those entitled "The Teacher in 1980" and "The Organizational Context of Teaching", both described below.

In Section II, "Program Summary and Projection", which follows immediately, each of the reformulated major program areas is delineated. In each of these there is first a description of existing projects followed by a projection of plans for the years immediately ahead. The purpose of this second section is to describe the territory and its problems as it now appears to us, and to indicate the framework which will serve as a guide for the transformation of ongoing projects into the fully integrated endeavor. which the Center is becoming.

II. Program Summary and Projection

In keeping with the reformulation of the Center's domain, this section is divided into three sets of interrelated projects and activities dealing, in turn, with the behavioral, the personological, and the institutional aspects of research and development in teaching. In each section, the interrelated projects and activities centered on that particular aspect of the program are described. Within that section, the current projects will be described first and then the proposed future program as now planned will be portrayed. For each program and each project within that program, the objectives will be stated as specifically as possible, and the relationships of the specific projects to the objectives of the program will be indicated. For each program, a summary will indicate the progress to date as compared with previous program projections, the activities planned for the next contract year, and the projection of the program -- its objectives and the strategies for achieving them -- for the next five years.

A. The Behavioral Domain -- Teacher Behavior: Its Effects and Determiners

The objectives of this program are to conduct research and development on (a) the effects of various kinds of teacher behavior on pupils' learning, and (b) the effects of various programs and procedures of teacher education on teacher behavior. In short, this program is concerned with teacher effects and teacher education.

The various projects continued to make progress as described below. The Technical Skills of Teaching Project initiated an effort toward preparing a monograph that would describe all of the rationale, theory, methods, and results that have been produced thus far. The major problem encountered during the reporting period was that of effecting greater conceptual integration among the various projects in this program. An explanation of the relation of each project to the program objectives and a brief report on its progress to date follows.

1. Present Projects

(a) Technical Skills of Teaching: General (D. W. Allen and F. J. McDonald). This project has been investigating training variables intended to foster the acquisition of certain teaching skills. The investigations, which take the form of a series of related experiments, test the power of one or more variables to influence the learning of a specified skill. Successive experiments pit variables studied in preceding experiments against each other and against new ones studied for the first time in that experiment. The experimental strategy assesses the relative effectiveness and the specific effects of these variables in combination and singly. Variables which appear to be effective in producing learning of a teaching skill are incorporated into training procedures and studied as part of a program of developmental research on learning to teach.

Two categories of variables are being studied: (1) those related to using models of a teaching skill; (2) those related to methods of reinforcing the desired behavior. In the first category, students (trainees) are exposed to different kinds of models, for example, one who portrays only the desired behavior or one who portrays instances of both desired and undesired behavior. The hypothesis being tested in this case is that the trainee learns better by seeing only instances of the desired behavior rather than seeing both what is desired and what ought to be avoided. In the second category, the trainees are reinforced both positively (for the desired behavior) and negatively (for omissions or contradictory instances) or are reinforced only positively.

The technology of the experiments facilitates the study of these kinds of variables. A videotape recorder is used to record a trainee's teaching performance along with that of an experimenter who uses different methods of cueing and reinforcing. Similarly, carefully prepared model tapes are presented to the trainee before he actually teaches. A typical sequence is: (1) view a model tape; (2) teach; (3) view the tape of one's teaching performance with an experimenter; (4) view the model tape again; now repeat the cycle. This basic sequence can be varied in many ways; for example, one can test the effects of varying degrees of viewing the model, from none at all to viewing before each teaching session; or one can vary the number of reinforcing sessions from none to one with each teaching session; or one can vary the number of teaching sessions. As noted above, both the kinds of model presented and the characteristics of the reinforcing sessions can be varied. Finally, since most of the experiments are conducted in microteaching sessions, relatively little time elapses between the components of the sequence and the experimenter gains great control over extraneous factors. In this respect, the experiments are conducted with the same efficiency as any well-run psychological experiment.

The above description of the experimental plan has been given to provide the context for a description of ongoing research and to indicate that the project consists in a sequence of experiments conducted over several years, three to five experiments being performed each year. Thus, its long-term outcome is likely to be cumulative. The project is probably unique in research on teacher education, in terms of its scope, systematic quality, and truly experimental character.

The dependent variables in these experiments are complex teaching performances assumed or known to be related to pupil learning. Although the case for the effect on pupil learning has to be made on independent and empirical grounds, some data gathered in these experiments indicates changes in pupils. For example, when trainees learned how to reinforce student's participatory responses, the number of these responses increased greatly. Until now, however, our emphasis has been on how the teacher learns. Future research will more closely integrate teacher learning and pupil learning. The project on the Technical Skills of Teaching:Explaining has studied the effects of teacher behavior on pupil learning. Future work will integrate the approaches of these projects.

The technical skills studied to date have been largely interactional skills, those which facilitate the tutorial and dialogue modes of teaching. (One exception, Experiment 7, dealt with selected lecturing skills.) These skills were chosen because such skills usually were not in the repertoires of teachers; or, if component behaviors were, they could not be put together in the complex performances desired in teaching. Teachers do not have the skills at all or they have component behaviors to such a high degree that they experience little difficulty in learning the complex performance. Trainees who have the skills or large parts of them are poor subjects in our experiments in that they are not naive, and hence, show little learning. We have embarked on a discussion of methods of identifying such persons so that we will not use them as subjects, and can design different training experiences for them. This is a first move into the domain of aptitude-interaction research represented in an affiliated project of the Center. Differences among trainees also suggest repetition of some earlier experiments to determine whether effects of training variables with naive subjects will be more powerful than they have so far appeared to be. We have discussed these problems with the Center's Unit on Research Methodology. A member of that Unit assigned to this project will participate in the design of pertinent experiments.

Each experiment described below was conducted during 1966-1967 according to the format described above. The trainees in each experiment were students in the Secondary Teacher Education Program at Stanford. The experiments are part of their training program; each experimental treatment is bona fide training experience and is so described to the trainees. As much information as possible is given to the trainees about what is being learned and why; only the specific variables being tested are not described until the experiment has been completed.

Experiment 4: Varying the Stimulus Situation (Experiments are described by the skill being learned.) Varying the Stimulus Situation is a skill whereby the teacher continually varies the perceptual stimulus presented to the student. It is based on the assumption that if the perceptual stimulus is not varied, the student habituates to the one present and his attention flags, and that if the stimulus is varied, his attention will be maintained. Maintaining his attention is a precondition to learning. The specific behaviors of the skill are movement, gesturing behaviors that focus attention, and shifting sensory modalities required at any given moment. For example, a teacher who has the skill varies his physical location in the classroom requiring the student to reorient.

In this experiment, the independent variables were two modeling conditions compared to a non-modeling treatment. A positive model of the behavior was compared with a negative model (one who exhibited none of the desired behaviors) and a combination in which the model did present the desired behaviors some of the time and did not the remainder of the time. In fourth treatment, detailed written instructions were given to the students about the desired behavior. The latter condition was used as a control to test the effectiveness of the modeling conditions, singly and in combination.

No significant differences were found among the four conditions. This result was unexpected since the model conditions portrayed a behavior which was essentially perceptual in character, that is, more easily identified when seen than when described. The data were intensively analysed to determine why no differences were obtained. We discovered that a number of the subjects already had the behavior to a degree that, in effect, no learning could have been demonstrated.

Another track has been taken by initiating discussions on kinesics with Dr. A. E. Scheflen, a psychiatrist and an expert in this field. We have conducted a series of seminars on the meaning of movements to assess whether the kinds of movements which are part of the skill do in fact communicate the kinds of information that they are designed to communicate.

This experiment will probably be repeated in the near future with revisions and modifications.

Experiment 5: Higher Order Questioning. Higher order questioning is the skill of asking questions which require students to engage in complex cognitive processes. Higher order questions are distinguished from questions which require only a factual answer. Usually higher-order questions require the students to explain, predict, apply a principle, and make similar responses which are considered to be major components in thinking. Many teachers concentrate on fact-oriented questions because they argue that students cannot think without facts. In teaching trainees to use higher order questions, we assume that students need to be queried not merely on fact-oriented questions but also, and more often than is now usual, on higher-order questions.

Experiment 5 is more complex than Experiment 4 in terms of the independent variables manipulated. Both symbolic (i.e., written) and perceptual models are used as in Experiment 4, but positive and negative models of each kind (symbolic and perceptual) are also used. In addition, the trainees were to teach either exactly the same lesson as the model or one of their own choosing. In typical conditions, the trainee read a set of instructions about the desired behavior, taught a lesson that had been prepared for him, and read written instructions which gave only examples of higher order questions. In an example of the contrasting treatment (perceptual modeling), the subject had seen the models present only instances of higher order questioning and taught the same lesson as the model taught.

No differences were found between the effects of perceptual and symbolic models. The absence of a difference in Experiments 4 and 5 has caused us to raise theoretical questions about the concept of modeling. It may be that with adult (and intelligent subjects) a detailed set of instructions is as effective as watching a performance. Future research will assess under what conditions a perceptual or a symbolic model is necessary.

Teaching a lesson similar to that taught by the model was more effective than teaching one's own lesson. This result suggests that the initial learning of the skill may best be mediated by a relatively literal imitation of a model. Positive modeling was most effective when the subjects transferred to a completely different topic than had been used during the training sessions.

Experiments 4 and 5 have led to a series of discussions aimed at developing improved and testable theory concerning the conditions under which modeling is effective.

Experiment 6: The Use of Teacher Silence and Non-verbal Cues. The skill to be learned in this experiment is the use of non-verbal cues, such as gestures, head nods, and silence, to foster student participation in class discussions. It is well-known that in our society, if one person is silent in an interaction situation, the other persons or person present will usually start speaking. This fact is used by psychotherapists, for example, to encourage clients to talk more. Group leaders in discussion groups frequently use the same technique. We speculated that the teacher could use such a skill to facilitate group discussion in the classes for the same reasons. These behaviors are not, however, usually used by teachers in preference to verbal behaviors.

The variables manipulated were reinforcement procedures and modeling procedures. Three forms of reinforcement were used: positive, negative, and a combination of positive and negative. Two modeling conditions were used: one in which the subjects saw the model alone, the other in which he saw a model with an experimenter who gave the trainee cues as to those aspects of the model's behavior to which he should attend.

The results of this experiment are not yet available. Cursory observation suggests that modeling conditions may have produced significantly different effects. If so, these data will be significant in analyzing the conditions under which perceptual or symbolic models are likely to produce differences. Similarly, this experiment should contribute to understanding of the conditions that make reinforcing especially effective. We have found reinforcing generally effective, but do not know under what conditions (i.e., with what skills) it is more effective than modeling in producing learning.

Experiment 7: Lecturing Skills. The lecturing skills taught in this experiment deal with only two aspects of lecturing, namely, "redundancy" and "high-lighting"; no attempt was made to affect all lecturing skills. The rationale for redundancy is that, in lecturing, verbal material is generated at a relatively rapid rate and assimilated at a much slower rate. Accordingly, repeating key ideas and concepts may improve students' assimilation of the substance of the material being conveyed. Several forms of repeating were used: (a) simply going over points previously mentioned; (b) repeating a single item at various points throughout the lecture, and (c) summarizing repetition at various points in the lecture. "Highlighting", also formulated as a skill, refers to emphasizing in a variety of ways the critical points on which the lecture is built.

The instructions to students described these component behaviors of lecturing skills and the reasons for using them. One independent variable in this experiment consisted in providing illustrations of the desired behavior through written examples or human models or a combination of both. In addition, each type of treatment was accompanied by a contingent or a non-contingent focus on the behavior to be learned. A contingent focus is a specific pointing out of the desired behavior; a non-contingent focus is a general description of what is happening. Similarly, the self-viewing sessions were conducted with either a contingent or a non-contingent focus. Our equipment enabled us to present the model films with double track so that the specific points can be made about the major feature being observed by the trainee. Also, during the self-viewing sessions subjects were given general descriptions of what they were doing effectively or ineffectively, or specific instances of desired behavior were pointed to.

The first question here was again one concerning the degree to which modeling in teacher education must be perceptual or may be symbolic. The second question concerns the extent to which cues must be provided to focus the trainee's attention on the behavior to be learned.

This experiment was done in two parts, the first in microteaching sessions, and the second as a followup in the classrooms of the teachers. This collection of data for experiment was completed recently. Results are expected to be available shortly.

Experiment 8: Teacher Control vs. Pupil Control. This experiment dealt with methods of teaching students how to shift the control of the discussion from the teacher to the pupil. The experiment ran into considerable difficulty, and therefore will be reported very briefly here. One major problem was that of finding a mechanism for shifting students from teacher-controlled to student-controlled discussions. We are now assessing the extent to which we have reasonably useable data.

Experiment 9: Inquiry-Inducing Skills. This experiment, currently in progress deals with methods of teaching a series of skills in inducing student inquiry. Such a skill is one in which the teacher essentially prompts the student to seek out answers to questions, formulate hypotheses, predict, and explain. It is a complex variation of the type of behavior that has been studied in other experiments. The kind of behavior being learned by the teacher is thought to be particularly important in stimulating critical thinking or inquiry skills.

The independent variable in this study consists of different kinds of models. One question that the study will attempt to answer is whether a prospective teacher learns more easily through watching somebody produce a desired behavior or through knowing what effect he wants to produce. In this experiment, the trainees were exposed to model teachers portraying the behavior that the trainees are to learn, or to students responding in a way in which is desirable.

The initial ratings of the behaviors that constitute the dependent variables of this experiment have just been completed, and the data analysis is beginning. The line of inquiry opened here tests a fundamental proposition about the significance of learning from viewing models. It has been noted, in commenting on earlier studies that we consistently find that a good set of directions not only does not inhibit learning but seems to be relatively effective in producing learning. These earlier results have raised the question of whether perceptual models are useful for all purposes. This inquiry is now extended in Experiment 9, which tests whether one need even observe the behavior to be produced if he knows what effect that behavior is to have.

Clinical Analysis of Disruptive Behavior. During December 1966, we conducted a clinic in which teachers who were having difficulty controlling their classes were enlisted in an intensive analysis of their classroom interaction. Stanford supervisors of intern teachers identified six teachers with the most severe disabilities in this respect. These teachers were then invited to participate in this clinic, and videotape recordings were made of their classrooms.

These teachers then met with a member of the Technical Skills staff, who analyzed the interactions occuring in the classroom. The purpose of this clinic for the Technical Skills Project was to make some preliminary analyses of the problems of controlling student interactions. The informal hypothesis was that the teachers were reinforcing the kinds of behaviors that they did not want. The analysis of the teachers with these severe disabilities confirmed this hunch.

It was also hypothesized that disruptive behavior of their students had been conditioned to certain kinds of teacher behavior. This analysis seems to have been confirmed by the preliminary clinical work.

We are now at the point of developing a model of the interaction process to account for these kinds of disruptive behavior. This model will then be tested by gathering data in actual classrooms on these behavior problems. The model has sufficient promise that it may serve as a basis for the analysis for other interactional skills.

(b) Technical Skills of Teaching: Explaining (N. L. Gage and W. R. Unruh). While recent trends in education appear to lean toward the use of discussion and discovery techniques as major methodological approaches to teaching, the continued use of lectures or "explanations" in many situations suggests that this remains a fit subject for research. One of the first tasks in the study of explaining behavior of teachers was to record, on videotape, two 15-minute lectures given by twelfth grade social studies teachers. These records have now been used in a number of studies in an effort to determine what factors make for an effective explanation. The criterion against which these factors were reflected was the class-mean pupil score, adjusted for pupil ability.

A study by Rosenshine compared "high" and "low" teachers on a comprehensive list of variables. This work, now nearing completion, suggests that several variables such as the number of explaining words used, the use of a rule-example-rule presentation technique, and the use of certain sentence patterns correlate with the effectiveness of the lecture presentations.

Using the same videotapes, Unruh has employed a number of raters to obtain information about all teachers in the study. Approximately 15 characteristics of the lecture-transcripts have been rated and are presently being entered on data cards. The intercorrelations among these variables--together with others, such as pupil comprehension scores, pupil responses to evaluation questionnaires, and other available data--will be obtained. This analysis should supply information about the relationship of certain teacher behavior variables to pupil achievement and the consistency of teaching behavior from lesson to lesson.

Since a number of people were interested in this area of research, several informal seminars, aimed at discussing what further use might be made of the data, were conducted during the autumn and winter quarters. These seminars involved some half-dozen members of the

Center staff as well as graduate students outside the Center. As a result of this activity, a number of related projects are now underway.

The locus of cues to teacher effectiveness is also becoming a center of interest. Mr. W. R. Unruh, under the direction of Dr. N. L. Gage, is currently preparing a doctoral dissertation in this area. The research involves the same set of videotapes as was referred to above. The lessons given by the teachers have been recorded in the form of typewritten transcripts so that raters may be exposed to the lessons given in seven different ways. These seven methods of exposing raters to teachers' lectures are referred to as types of "protocol" and are labelled as follows: typewritten only (T), audio only (A), video only (V), typewritten-audio (TA), typewritten-video (TV), audio-video (AV), and typewritten audio-video (TAV). The protocols were divided into four groups on the basis of pupil achievement scores, adjusted for pupil ability. One teacher was chosen at random from each quarter. A group of twelfth-grade students was assigned to each of the seven types of protocol. Their first job was to compare the four teachers to whom they were exposed and to rate these teachers by predicting the mean scores which their classes would get as a result of being exposed to that lecture. Since each teacher gave two lectures -- one on Yugoslavia and one on Thailand -- it was possible to carry out this study with two groups of four teachers. An analysis of variance design will be used to compare the relative effectiveness of the protocols as bases for predicting teacher success.

In a second phase of the study, the raters were required to supply adjectives and phrases describing the teacher performances to which they had been exposed. The raters were then asked to complete an adjective clocklist presented in semantic-differential form. These two sets of raters' descriptions of the teachers will be studied to determine relationships between descriptions and teacher effectiveness. We should also be able to determine the degree to which valid cues to evaluating teachers lie in the visual, auditory, or content portions of the lesson.

If relationships between descriptions and effectiveness can be found, the next step will be to define these descriptive terms operationally, i.e., in terms of observable behaviors and characteristics. Once this is done, further evaluation can be undertaken and training procedures can be devised to maximize behavior relevant to effective explaining.

(c) Technical Skills of Teaching: Foreign Language Instruction (R. L. Politzer). During the past year the major effort of the project has been devoted to the development of syllabi which will serve as models in the training of teachers of French and Spanish. At first a list of behaviors presumed to characterize the successful classroom teacher was established. This list was organized according to headings corresponding to the subject matter (e.g., teaching reading, speaking, pronunciation) and was based on the consensus of experienced and successful teachers. Then a training syllabus was prepared that showed how training in applied linguistics, language skills, and methodology could be applied in specific micro-lessons illustrating the behavior of the successful teacher. The training syllabus for French teachers was completed in June 1966, and the training syllabus for Spanish teachers is virtually completed.

At the same time a set of "Performance Criteria of the Foreign Language Teacher" were used as instruments of evaluation in the Stanford program for training foreign language teachers. To initiate a study of the validity of the Criteria, measures concerning these teachers are being gathered (scores on the ETS/MLA tests for foreign language teachers' skills as well as measures of knowledge of applied linguistics, knowledge of civilization, and professional preparation). To determine relationships between changes in pupil motivation and evaluations of the interns on the Performance Criteria, questionnaires designed to measure motivation were administered in May 1967.

A study of the reliability of the "Performance Criteria of the Foreign Language Teacher" was also initiated. There was relatively high agreement among seven raters watching videotaped performances. But the reliability study ran into the problem that given teacher behaviors were evidently perceived by different raters under different subject matter headings (control of audiolingual activities, reading of pattern drills, etc.). This finding indicated one direction for further research in the development of the "Performance Criteria" as a rating instrument.

The syllabus for the "Training of Teachers of French" and the "Performance Criteria for Foreign Language Teachers" were disseminated to all Directors of NDEA Foreign Language Teachers Institutes in 1966, to some Peace Corps training programs, and to about 150 state, county and city supervisors of foreign language teaching.

(d) Language Pattern Training and Reading Comprehension (C. H. Rinne). This project focuses on the language teaching aspect of the English program in the public high schools as differentiated from the literature, composition, and other areas which train the student to *apply* his knowledge of language. The study seeks to provide student performance data which will verify the effectiveness of certain teacher performance criteria, or "technical skills," in teaching language. The project will also build instruments to aid teachers in measuring student achievement in language teaching.

First the project seeks to determine (a) whether training a student to be aware of language patterns in written materials increases his power to comprehend the literal meaning of those materials, (b) whether students can learn the grammar (structure, pattern) of their language without learning grammatical terminology, (c) whether students of average-to-low verbal ability can learn grammar in a semi-programmed form, and (d) whether learning the grammar of his native language can improve the student's aptitude for learning a foreign language. (Robert Politzer is also studying the latter question with somewhat different materials.)

Randomly assigned experimental classes of high school freshmen and sophomores receiving remedial reading instruction were given (a) pretests of pattern awareness and literal sentence comprehension; (b) approximately six weeks of training in pattern awareness, in which easy-to-read programmed exercises, virtually free of linguistic terminology, are used to teach students to recognize and manipulate the major sentence patterns of English; (c) progress tests designed to monitor change in each student's pattern awareness. At the end of the training period (March 1967), posttests will be given in pattern awareness and literal sentence comprehension.

Each teacher of an experimental class also teaches a control class. Control classes take the tests but do not receive training materials; they are pursuing their regular curriculum, without grammar, during the training period.

The timetable of the experiment follows.

Summer 1966: Development of test instruments and training program

October-November 1966: Pilot study of test instruments and training program

December 1966: Revision and printing of test instruments and training program

	Experimental Classes	Control Classes
February 1967:	Pretests	Pretests
	Training program	Regular word-skill curriculum
	Progress tests	Progress tests
	Posttests	Posttests

April 1967: Evaluation of results and reports to participants

Final results will be published after the study has been completed in March. Thus far two new language achievement tests have been written -- one in "language pattern awareness" and the other in literal sentence comprehension. Nothing comparable to these tests has been available. It has also been noted thus far that, according to the teachers' reports, the high school students of remedial English (N=350) are much more involved, physically and emotionally, in language learning than previously.

The participating teachers report that they are intrigued with the study and pleased with the training materials. These materials, written and illustrated specifically for high school students, are almost unique. Even at this early date, the teachers seem to be discovering, through the project, new ways of teaching basic language skills to otherwise reluctant learners.

(e) Foreign Language Grammar Drills: Order of Presentation in Relation to Their Explanation (Affiliated Project: OE-6-14-025) (R. L. Politzer). The project is intended to determine whether, in teaching a foreign language pattern, it is best to give a conceptual (grammatical) explanation of the pattern (a) before it is taught, (b) shortly after it is introduced, (c) after the drill, or (d) not at all, with the time being used for additional drill. The project is thus concerned with a specific aspect of teaching behavior related to language teaching and perhaps to the teaching of skills in general.

The procedure consists in taping pattern drills and explanations and then splicing the explanation either (a) at the beginning of the tape, (b) after some presentation or (c) at the end of the tape. Additional drill exactly equal in time to the amount of time taken bu the explanation, is also produced and added to the tape in order to achieve treatment comparability. These pattern drills are then administered to four classes (at the same school) at set time intervals, but at a time before any learning of the pattern may have taken place during classroom instruction. Aptitude scores are obtained on all students taking part in the experiment to allow for possible aptitude differences among groups. It is also planned to obtain a measure of motivation for foreign language learning.

Only about four of the planned eight experiments in French and Spanish have been performed. Results so far do not show that any of the four treatments is clearly superior, but some evidence suggests that early explanation may be superior, especially with patterns which are more complex and different from the English counterparts.

(f) Improving Achievement in Foreign Language Through Programmed Training in Selected Skills Associated with Language Aptitude (Affiliated Project: OEC4-6-05109701231) (R. L. Politzer). This experiment is intended to determine whether achievement in foreign language learning can be improved by specific training in auditory discrimination, sound-symbol relationships, and syntactic awareness -- all skills thought to be associated with foreign language aptitude. The data of this study may indicate that training in basic language skills can improve foreign language learning. If so, further research must determine (a) what specific language skills are most highly related to foreign language achievement in today's schools, (b) what methods are most effective in teaching these skills, and (c) what are the characteristics of the student population which profits most from such training.

Technical skills in teaching foreign languages to slow learners need to be developed; if teaching slow learners basic language skills helps them learn, a catalogue of technical skills must include such a practice.

In this experiment, seven pairs of experimental and control classes of high school foreign language students have been pretested with the Modern Language Aptitude Test (MLAT). Experimental classes have subsequently received special training materials on auditory discrimination, sound-symbol relationships, and syntactic awareness. Control classes have recieved no special training. Following the training period, both groups are being tested with three sets of progress tests that monitor their achievement in language learning.

In addition to the high school experimental setting, this project is working in the Defense Language Institute (DLI), Monterey, California; the Institute has incorporated experimental training into five language areas, involving approximately 250 experimental and control subjects. Like the high school groups, DLI groups have been pretested for language aptitude (with the Army Language Aptitude Test); experimental groups then received special training materials in basic language skills. Achievement of both groups will be monitored in the following months.

In the high school experiment, results of the first of three progress tests do not reveal any significant difference between the two groups in foreign language learning achievement. These results are not unexpected since the high school students in general did not achieve satisfactory scores on the training program criterion measures.

In the Defense Language Institute experiment, results of achievement in foreign language learning have not yet been reported. Students' scores on the training program criterion measures are satisfactory, however; hence, the results indicate that the training materials are better suited for the DLI subjects (typically highly motivated young adults in their early twenties) than for the high school students.

(g) Technical Skills in Teaching: Social Studies (R. E. Gross).

The objective of this project is to create a series of videotapes showing social studies teachers manifesting various specific behaviors. These tapes will then be used to help train future intern social studies teachers at Stanford. In addition to the videotapes, a set of scales is being developed for use in rating and classifying the performance of social studies interns. It is held that the performance criteria used for all intern teachers at Stanford are too general to apply to all important aspects of social studies teaching.

The procedures used for securing the videotapes during the past year have varied. Aid was solicited from regular teachers in the Bay Area; the response has been good. These teachers were asked (a) to teach using a specified behavior and (b) to teach normally with the exception of videotaping in the room. The social studies intern teachers in the various schools in the area have also been used. These schools personnel, highly cooperative in permitting us to observe them in operation, have provided a good supply of videotaped teacher behavior.

In videotaping the various teachers, the project developed a tentative frame of reference for identifying behaviors considered to be of prime importance.

A study conducted during the year tested the hypothesis that presenting teachers with a videotape plus significant oral discourse increases the incidence of a desired behavior. The particulars of this study were reported in the Quarterly Report #3 of the Center. Although the study is not yet completed, the results indicate that the videotape-plus-oral presentation produces a much higher incidence of a desired behavior than does either the videotape or the oral treatment alone.

In the development of the performance criteria, the initial step was to extract from the existing rating form used for most intern teachers at Stanford the material considered relevant to the social studies teacher. Next, other rating forms were examined to identify additional relevent items. A lengthy list of criteria was assembled, then reduced to eliminate overlapping and improve clarity. This revised set of criteria is now being examined by all persons involved in the training of social studies interns at Stanford. A final draft should be available in the near future for trial use.

Results to date have been encouraging. As mentioned earlier, the one controlled evaluation produced some very positive results concerning the use of videotape in a training procedure. Also last summer, tapes were used in training interns in leading small group discussions, in introducing a unit, and in eliciting student reports. This training, although not objectively measured, was judged to be quite effective by students, instructors, and observers.

When this project began, no use had been made of videotapes in training social studies teachers; the project has now attained considerable sophistication. To reach this level, all prior literature on video training was reviewed. Then more useful frames of reference were developed, teachers were contacted, videotapes were edited and reviewed, and behavioral criteria were further refined. We now have a usable, though not complete, library of tapes.

In both aspects of the project, problems have been technical rather than theoretical. Problems of semantics and inter-personal communication arose in the development of the performance rating sheet. Differences of opinion about what was observable, and to what degree, tended to be the most persistent. These differences have been resolved, and essential agreement has been reached. In videotaping, the main problems arose in the technical aspects of getting usable tapes of what we wanted to observe. It may be necessary to "create" certain tapes in laboratory situations. Also the coordination of the teacher's presentation with staff visits and availability of videotaping equipment caused some delay. These difficulties have, by and large, been eliminated by improved communication between the project worker and the teachers involved. The audio-visual taping crews and directors have been most helpful in eliminating technical difficulties.

(h) Role-Playing: Its Use in Teaching Decision-Making Abilities (Fannie R. Shaftel). Role-playing presents the teacher with modes of teaching quite different from conventional teacher-behaviors. It demands such new skills as deciding when to structure, when to facilitate individual ideas, and how to mediate within the group. This project is concerned with further refining the technical skills needed in this kind of teaching and with developing procedures for training teachers in these skills.

Role-playing is representative of a number of procedures entailing decision-making processes and open-ended inquiry that demand new approaches to students and teaching.

Inquiring as a means of learning decision-making is a key concern in the social studies. This involves (a) processes for inquiry through role-playing and (b) strategies of teaching that enhance these processes.

The purpose of the present research is to explore the (a) behavioral aspects of role-playing, i.e., the behaviors of learners and teachers that occur in using role-playing as a decision-making process and the specific sequences and units of action that can be discerned as characteristic of role-playing sessions and (b) the outcomes of role-playing in their decision-making aspects, i.e., abilities in defining and developing a problem situation, antecedent-consequent thinking, originating alternative lines of action, becoming more sensitive to one's own and others' feelings, observing the influence on role-playing of the sociometric structure of the classroom; and using role-playing to influence sociometric structure.

In a pretest-posttest experimental design, ten role-playing sessions will be conducted in each of five 6th-grade classrooms. Each of the five classrooms will be matched with a "control" class, and the experimental class will be chosen at random from the pair. Several questionnaires will be administered both before and after the ten role-playing sessions, which will be tape-recorded and observed. The participating classroom teachers will be interviewed to draw on the teacher's knowledge of her students and thus facilitate the role-playing process.

The project's initial planning, just being completed, is concerned with instrumentation, training of teachers, selection of classrooms, and purchase of equipment.

Videotape recording was tried and, for this next project, may be abandoned, as it may interfere with the "safe environment" required for optimum exploration of the role-playing content.

A major problem is the development of instruments that will appropriately measure the kind of interpersonal and intergroup problem solving with which we are concerned. Various instruments have been examined, and some have been used with one classroom of children. We are not satisfied with these instruments and are actively pursuing this task. John Lohman of the University of Michigan, met with the project's staff on March 23-24 to assist in the selection and development of instruments.

A small pilot project with problem pictures to be used with very young children (4-6 year olds) with an adaption of pantomime, modelling and role-playing procedures, is being prepared. A training film on role-playing procedures is being planned.

A monograph is being prepared by F. Shaftel and Martha John on the pilot project of Spring Quarter, 1966.

(i) Teaching in Small Groups (R. N. Bush). As new technologies become available and as new demands force themselves upon the schools, substantial shifts in the role of the teacher are likely to take place. We incline to the view that the teaching of pupils in small groups will become more prominent. Consequently, we have assembled a small task force to explore ways in which this problem might profitably be attacked. Efforts thus far have consisted of discussions among behavioral scientists, educationists, classroom teachers, and school administrators. Videotape recordings of teaching in small groups, as it occurs in schools, have been made. Several "model" tapes of different styles of teaching in small groups have been made, and some statements concerning teacher and pupil behavior exhibited and desired have been formulated. These materials have been discussed at several conferences at Stanford University and elsewhere at professional meetings. Efforts to develop experimental designs have thus far been waiting upon improved definition of the variables to be investigated.

The manner in which teaching in small groups now typically takes place, especially at the high school where we have done most of our observation, seems to require major alteration through the re-training of old teachers and the training of new ones.

During the coming year, we plan to establish a pilot training group of six to eight teachers, as many as possible of whom will be in one or both of our field station sites. During the next few months, we propose to try new training procedures, test observational techniques, and obtain as much relevant data about the teacher and the pupil and their interactions as may be possible. Following this, we plan to select approximately 20 teachers from the fields of social studies, science, and English, each of whom will have several small groups per week to be studied during the entire school year 1967-68. Thus, we may have as many as 1500-1800 students working in small groups with these teachers. We intend to give the teachers a two-week training seminar in the summer of 1967 and to follow their work with small groups as it develops over the entire school year 1967-68. Among the dimensions on which we intend to gather longitudinal data as the small groups develop during the year are: pupils' attendance and participation patterns, academic achievement, attitudes toward and perceptions of the teacher and of each other, interaction outside of the class; topics covered and tasks undertaken by the small groups and the method of their selection; teachers' participation patterns, attitudes toward, and perceptions of individual pupils and the group as a whole. In collecting data, we shall use 35mm still photography, videotape recordings, student and teacher self-reports, and data from independently trained observers and interviewers.

(j) Teaching for Divergent Thinking (Pauline S. Sears). Skill in divergent thinking is increasingly being recognized as an important educational objective. Little is known, however, about how to achieve this objective, outside of some inspirational and crude types of demonstration of the Osborne (brainstorming) type. Another serious question is that of the effect of computer-assisted instruction on the development of skill in divergent thinking.

The problems are those of determining which teaching methods facilitate or impede children's development of a specific type of thought. Ultimately, such research should contribute to a systematic understanding of the effects of certain styles of teaching. The specific objectives of the project are to determine conditions under which divergent thinking develops optimally, to determine which areas of the curriculum and methods of teaching, in combination, are most evocative of divergent thinking, and to determine methods of teacher training which promote teacher efficiency in this regard.

Preliminary studies of Mexican-American and Anglo children's performance on an Unusual Uses test have been made. The results can be quickly summarized: (a) Age (five years compared to nine years) was not significantly related to divergent thinking scores. (b) Sex was significantly related; boys were more fluent than girls. (c) Ethnicity was significantly related to score on naming unusual uses for a cup; Anglos were higher than Mexican-Americans. (d) Intelligence was not related to ability in divergent thinking.

A systematic behavior sampling schedule was used in the spring and fall of 1966 with nearly 100 first-grade children who are now being taught reading and arithmetic by computer at the Brentwood-Stanford project directed by Professors Suppes and Atkinson. In May 1967, this behavior sampling will be repeated. The results will be analyzed as to their relationship with the children's progress in reading and arithmetic. Here we investigate a variety of variables, such as

(a) Tendency to pay general attention to a school activity; orientation to task; persistence.
(b) Satisfaction in task
(c) Primary factors in motivation toward task performance
(d) Anxiety over task performance
(e) Dependency on the teacher
(f) Dependency on social interaction with other children
(g) Cognitive development in several areas; cognitive style, curiosity, flexibility of mental set, etc.
(h) General activity level

The data for the Spring 1966 behavior sampling, already analyzed, show sufficient observer reliability and range in childrens' scores to indicate that they will yield reliable measures of individual differences. Analysis of the total data awaits the May 1967 sampling.

Workshops have been held in four locations in California to explore with teachers and supervisors the suitability of various curriculum areas and teaching approaches for the promotion of skill in divergent thinking. These workshops have proven valuable in exploring dimensions of the problem. (This work will probably be made more systematic in the future.) It appears, upon close scrutiny by curriculum workers and teachers, that the usual elementary school curriculum provides more scope for divergent thinking than is usually thought. Those participating in the workshops are of the opinion, however, that little advantage is being taken of this opportunity by most teachers. This suggests that it is not necessary or desirable to have a special period for "creativity" or divergent thinking. Rather efforts should probably be made consciously to vary the types of thinking called for in the usual activities and curricula of the classroom.

(k) _A Taxonomy of Teaching Behaviors (D. W. Allen and R. E. Snow)_. The need to observe, describe, and assess teacher and student behavior in the classroom has long been a concern of school administrators, teacher educators, and educational researchers. Discussion and research in this area have produced a voluminous literature and a myriad of techniques and devices. Because these instruments mirror their authors' emphases and predilections, they vary in their usefulness for given purposes and any single instrument can serve only a few of many possible objectives. Of necessity, each instrument is a compromise conditioned by contrast between the information desired and the resources available to obtain it. Research using such instruments is similarly limited. As Ryans* has observed in a recent review of research dealing with the assessment of teacher behavior:

> "An overview of the reports suggests that investigations have been piecemeal and fragmentary for the most part; only occasional attempts have been made to conduct coordinated programmatic research or to relate studies to some theoretical model" (p. 415).

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*D. G. Ryans, Assessment of teacher behavior and instruction, _Review of Educational Research_, 1963, 33, 415-441.

To facilitate programmatic research and, in turn, to promote systematic teacher training and administrative decision-making, a far more comprehensive and flexible observation system is needed. It must, in effect, encompass the objectives of all existing instruments and provide a coordinated vocabulary for the description of classroom behavior.

The purpose of the project is to design such a system. The present report outlines some general design characteristics and describes procedures being used in developing and organizing the system. Preliminary examples of the system's content and some thoughts on its eventual form are also presented.

The literature of research on classroom behavior and the observational techniques used therein has been reviewed elsewhere.* These reviews and further consideration of the problem permit some general and specific observations regarding the form and content of a proposed observational system.

Previously used instruments can be characterized as either category systems or sign systems. The former typically consists of a few categories into which all observed behaviors can be classed and usually reflect a particular and relatively narrow theoretical position or interest. The latter are composed of lists of teacher acts which may or may not be observed in a particular setting and usually suggest a broad survey of specific hypotheses rather than a pre-formed theory. The present objective is to produce a descriptive behavioral system which can incorporate both of these approaches It must therefore be conceived as a universe of classroom behavior descriptors, similar in some respects to the universe of personality trait descriptors being developed by Norman.* The universe takes the form of an item pool from which samples of signs or sub-systems of categories can be extracted.

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*D. Medley and H. Mitzel, Measuring classroom behavior by systematic observation. In N. L. Gage (ed.), Handbook of Research on Teaching. Chicago: Rand McNally, 1963. pp. 247-329.

D. G. Ryans, op. cit.

R. D. Boyd and M. V. DeVault, The observation and recording of behavior, Review of Educational Research, 1966, 36, pp. 529-551.

The notion of a comprehensive pool from which items can be selected suggests that selection should be guided by one or more models which stratify or otherwise provide organization for the pool. The models should have general theoretical utility though they need not (and perhaps should not) display particular theoretical orientations. They should, however, be based on some rudimentary conceptions of relevant behavioral processes. Model construction should be guided by what is now known about teacher and student behavior, not by the practical concerns of what can be observed in the classroom. As a by-product, the vocabulary represented in the organized pool may provide a taxonomy of classroom behavior.

The item pool, and the observation procedures associated with it, must permit the description of behavior at varying levels of abstraction and detail, since different levels will be required for different purposes. It must also permit observations to be made, either simultaneously or sequentially, at different levels of specificity and allow these observations to be systematically related to one another. The idea of sequential testing, first developed in industrial quality control and now applied to achievement testing and computer-assisted-instruction, may prove useful in this context.

The item pool must be made adaptive and self-developing. New items and modified items might be incorporated into the pool directly from observer use if the system provided for spontaneous recording of critical incidents in classroom behavior. The dimensional structure of the pool would thus change over time as items were added and experience with the system accumulated.

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*W. T. Norman, A universe of personality trait descriptors. Ann Arbor: Department of Psychology, University of Michigan, September 1966, (Mimeo)

The system could also be conceived as a kind of data bank, including computerized data accumulation and processing components. Specific research studies or teacher training projects could be planned with appropriate sampling from the item pool. These studies could contribute data and special findings to more general item analyses, teacher performance analyses, and model development. In an automated system, each use of a given item or observation of a given teacher could be indexed; accumulated records or ratings could be readily produced. Also, the system should be closely coordinated with the continuing application of other computer technology, and the system should incorporate the use of videotape and time-lapse photography for recording classroom behavior.

The first phase of work on the contemplated system grew from concern over the adequacy of existing observation schedules. It began as a combination and generalization of the Stanford Teacher Competence Appraisal Guide and the Performance Criteria, both of which are rating instruments currently in use in the Secondary Teacher Education Program at Stanford University. The items of the Guide and the Performance Criteria, together with some additional items obtained from critiques of these instruments by experiences observers, provided an initial outline for the pool.

Many items were added to these; they were suggested by a review of other instruments and by discussions of classroom observations in the research literature. Additional items were also written to fill gaps appearing in cross-tabulations of existing item categories. A preliminary pool of approximately 5000 items is now in hand to serve in exploratory examination of the proposed system.

A second, or editorial, review and evaluation phase began as the preliminary item pool was accumulated. Items were indexed using a key word approach. Given a specified key word, all items either including that word in context or implying the word as an underlying key concept could be drawn from the pool and examined to determine the degree of coverage or redundancy obtained. The following items provide an example of a small section of the pool:

T	answers S Q about assignment.	Assignment
T	monitors in-class assignments.	Assignments
T	associates content with variety of S experiences.	Associates
T	begins by instruction to attend.	Attend
T	encourages S's to attend.	Attend
T	reminds S's to continue to attend.	Attend
T	uses withdrawal of attention as negative reinforcement.	Attention
T	focuses S attention on task.	Attention
T	is aware of signs of S attention.	Attention
T	recognizes S raised hands.	Attention
S	recognized by T without raising hand.	Attention

In its present state, the item pool represents a kind of rough dictionary of classroom variables which may have heuristic value as a reference in research planning. If it is decided to proceed with development of the system on a larger scale, at least three further phases of the project can be envisaged. First, extensive item revision and elaboration would be accompanied by computerization of the system. The key word index was planned to serve both the preliminary work and the eventual automation of item selection procedures. Other kinds of indexing and data storing and retrieval processes would also be included to form the data bank.

Second, several pilot investigations would be planned and conducted using subsets of the item pool. The aim of these studies would be to explore alternative organizing structures and models for the pool. Logical analyses following the facet-theoretic approach of Foa[*] and multidimensional scaling analyses based on similarity judgments or other ratings could be used. Several of the theoretical issues and models directly relevant to objectives of the present project were considered in a 1967 AERA symposium on "The Development of a Critical Language for the Analysis of Classroom Behavior." This symposium, organized and chaired by Center staff members, included two Center papers pertinent to project objectives: "Applying the Language of Behavioral Models to Teaching Acts" by F. J. McDonald, and "Brunswikian Approaches to Research on Teaching," by R. E. Snow. These papers have been issued in the Center's Research Memorandum series.

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[*] U. G. Foa, New developments in facet design and analysis. *Psychological Review*, 1965, 72, 262-274.

Third, the system would be developed for classroom application. Tryout studies would investigate alternative forms of item presentation and use in classroom observation. Trials would also include analyses of item operating characteristics in various applications. Eventually, the developmental work might extend the computerized data collection and analysis components to include sources of data on teacher performance other than observer ratings and direct classroom observation. Item selection from the pool might then be based on observer responses to immediately preceding items, and could thus be made adaptive even within single class meetings. In short, computer-assisted instructional evaluation systems as comprehensive and flexible as computer-assisted instruction systems can be envisioned.

At present, plans are being made for the introduction of selected portions of the item pool into the Stanford Secondary Teacher Education Program to be used with the next intern class. Portions of the pool are now being reviewed and selected for this purpose, and supervisors in the program will be instructed in the use of these items. This provisional introduction will be followed by the development of a more complete operational system by the beginning of 1968.

(1) Measuring Attending Behavior Through 35mm Time-Lapse Photography (D. W. Allen). The use of 35mm time-lapse photography has been focused exclusively on a phenomenon identified as students' attending behavior, or paying attention to the learning tasks. The 35mm time-lapse photographs are the record from which the evaluations of this behavior are made.

Early investigations of attending behavior and its measurement were concerned with the reliability of this technique. Further studies indicated that most new teachers were totally unaware of the visual cues to attending behavior recorded by the time-lapse camera. Teachers with three or more years experience, however, were more aware of these cues and used them more in evaluating their teaching.

The next step in the investigation was to see if the ability to recognize cues to student attending behavior could be learned by beginning teachers. A study was designed in which three groups of Stanford interns had time-lapse photographic records made of their classes. Two of these groups were given graphic reports based on the photographic record of their class. The reports compared the interns' perceptions of attending behavior, made at the end of the class, with the perceptions of independent raters who viewed the 35mm film strip. These raters were trained to use the visual cues identified in the early studies. The two intern groups receiving reports also received a written discussion of attending behavior and the use of attending behavior cues. One of these groups also received the photographic record of their class, but with no specific instructions. The third group was a control.

Three weeks later a photographic record was made of the classes of the teachers in all three groups. The teachers receiving feedback showed significant increases in agreement with the raters' perceptions. The control showed a decrease in agreement with the raters' perceptions.

Since the beginning of this year, two experiments have occupied the staff concerned with the time-lapse photography study. In the first, designed during the Summer quarter and presently being conducted in intern teachers' classrooms, the effects of four modes of feedback on increasing interns' perceptions of attending behavior cues are being studied.

In a 2 x 2 design, interns rate a filmstrip record of one of their classes under two conditions, either alone or with another intern. Feedback from independent raters, based on the same filmstrips, is present for half the classes and absent in the others. Data of 72 subjects in the four experimental groups will be available for analysis during Spring quarter 1967.

The second experiment is presently being formulated. This study will attempt to estimate the validity of measured attending behavior using 35mm time-lapse photography. In a previous study a self-report questionnaire, in which the students reported their attending behavior for the class period, was administered at the end of a photographed class period. The correlation of the self-report ratings with the independent raters' perceptions was determined. In an attempt to measure degree of attention conveniently and realistically in the classroom, B. S. Bloom's method of "stimulated recall" will be used. We shall gather recall data and attending behavior data to determine the extent of their correlation.

Two other studies are presently in progress which incorporate measured attending behavior as a dependent variable. The Shoreline School District in Seattle, Washington, is studying different styles of in-service supervision. The Fremont California Unified School District is currently conducting a study to determine if 35mm time-lapse photography, used as an observation and feedback device in the supervision of teachers, will increase the effectiveness of supervision.

(m) Review of Recent Literature of Research on Teaching (N. L. Gage and W. R. Unruh). A critical review of the literature since 1961 related to measuring teacher effectiveness in the classroom is being made. Approximately 300 articles -- principally those published since 1961 -- have been studied. Many of these have been abstracted and have been discussed in a chapter to be published in the June 1967 issue of The Review of Educational Research; N. L. Gage is chairman of the committee for this issue.

The purposes of the review of the literature are fourfold: to provide a quick reference for students in the field, to indicate recent accomplishments and the current trends, to point out major strengths and weaknesses in current research, and to provide a reference point for other articles of a similar nature published in the past and currently being prepared elsewhere.

(n) Individual Differences in Learning Ability as a Function of Instructional Variables (Affiliated Project: OEC-4-6-061269-1217) (L. J. Cronbach and R E. Snow). During its first ten months, the project has necessarily moved in several directions, since the end-problem toward which we are directing our efforts embraces a number of loosely related topics. While no one of the subtopics is yet well understood by psychologists, we are attempting to deal with the whole complex in order to get clear what is known and where future efforts will best be invested.

The grand objective, toward which this project is a first exploratory step, is to determine what person characteristics cause a person to respond better to one instructional procedure than to another. To map such "aptitude-treatment interactions" calls for an identification of the person variables of greatest significance, for development of a framework in terms of the instructional variables of greatest significance, and then for fitting into the intersections of these two systems interactions as they are observed. It is evident that a systematic testing of all the possible intersections of variables would be an interminable process, and we therefore are searching for conceptual or theoretical leads that will provide a basis for choosing experiments of this sort. At the same time, our exploration is concerned with learning how to conduct such experiments; this type of study is evidently going to be more expensive than simpler types of instructional research, and a good deal of thought needs to be given to strategy and and efficiency of design.

One type of information, present to a far greater extent in the literature than direct studies of interactions, comes from correlational analyses of the relation between rate of learning and aptitudinal variables. Studies of this sort may or may not use controlled instruction; often the dependent variable is rate of learning under simple practice conditions. The studies use only a single learning treatment rather than the contrasted learning treatments required to show interaction. Nonetheless, we see these studies as one basis for the needed conceptualization and hypothesis formation.

To make sense of this contradictory and controversial literature, it is necessary to study the methodological problems of using learning rate as a dependent variable. Several questions are involved: Can one identify "stages" in learning and obtain separate measures of progress at different stages? Can one develop acceptable measures of learning rate that avoid the regression fallacies inherent in "gains" scores? Can one estimate the reliability of learning rate?

On the side of person characteristics, we are forced to think through the implications of the various proposed definitions of aptitude to decide which variables, if any, are likely to forecast rate of learning under one or another condition. This has involved us, on the one hand, in examining research programs such as that directed by Guilford and, on the other, of examining studies of transfer and learning to learn.

These themes were all present in the original proposal. Our reading, reflections, and analysis to this point have led to some shifts in priorities and to some clarifications of the underlying problems. In particular, we have found it increasingly necessary to give attention to these more basic problems, and less to the studies with instructional variables, because the literature on the basic problems is obscure and undependable. While it is a considerable gain to have this more realistic picture of the complexities of this research area, progress will be slower than originally hoped for. There have been other conditions putting the work of the first year behind schedule: a delay in contract negotiations which postponed the starting date of the project; interference from other commitments, including Cronbach's responsibility for a new ESEA Title IV training program; serious illness of a staff member, etc. The expenditure of project funds has been correspondingly slower than originally scheduled.

Literature search and integration. A massive search has been made for studies relevant to the problems outlined above, and some 400 abstracts have been prepared and catalogued. The integration of this material is proceeding slowly because of the repeated finding that an author's original conclusion is untrustworthy. We have therefore had to give much closer attention to details of the investigations than a review ordinarily requires.

We started with a tentative formulation of ideas in the various subareas of the problem, and this formulation is being revised and sharpened as we proceed. While we are not close to the point of formal publication of this material, it has been moved forward through relatively informal presentations. Cronbach delivered a lecture entitled "The New Definition of Aptitude" to the staff of the Educational Testing Service during his appointment as Distinguished Visiting Lecturer, June 1966, and also conducted two seminars there. Snow delivered a paper entitled "Response Complexity and Experimental Design" to the California Advisory Committee on Educational Research in November 1966. During the next twelve-month period the literature survey will be brought to a draft summary, though for reasons already mentioned the final form or the date of its completion are uncertain.

Methodological studies. Our methodological studies have been scattered, since each one arises in the context of difficulties in accepting the conclusions of an investigator. Only one study has been pushed to the point of publication, though others are likely to be formalized in technical reports.

Hofstaetter[*] performed a factor analysis of mental test scores at successive ages, and used the results to support the claim that the nature of mental ability is qualitatively different at different ages. Others have recently used this report as evidence substantiating some of Piaget's major conclusions. Our work (in press, _Child Development_) demonstrates that the Hofstaetter conclusion is an artifact of his procedure, and that entirely different factorial structures would emerge if the data were treated differently. The Hofstaetter study is thus seen to be irrelevant to Piaget's work. The study has some relevance to the analysis of stages of learning made by Fleishmann,[**] though Fleishman's studies are not artifactual in the sense that Hofstaetter's is. During the next twelve months we propose reanalysis of Fleishman's data to clarify the evidence for "stages" in learning.

The Guilford program of work offers a taxonomy of aptitudes that, if dependable, would have to play an important part in any theory of the relation of person characteristics and learning. We have been dissatisfied with the conclusions drawn by Guilford, even though the program of work is a distinguished one. The essential question is whether the factors outlined in his "structure" are being verified by his evidence, as he claims. His factor analytic methods are open to some question. We have developed a nontechnical but direct scheme for checking the Guilford hypotheses and applied it to one of his studies that involves 900 correlations. The results indicate general support for the Guilford "content" factors, and no support whatsoever for the "product" dimension of his system. We have ideas for a more technical and more informative factor-analytic scheme to test his model. Either this or the present nontechnical method will be applied more widely. The question being raised has broad implications for the use of factorial analysis in test validation.

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[*] P. R. Hofstaetter, "The changing composition of 'intelligence': a study in T-technique," _J. Genet. Psychol._, 85, 159-164.

[**] Edwin A. Fleishman, "The Description and Prediction of Perceptual - Motor Skill Learning," in Robert Glaser (ed.), _Training Research and Education_, New York, John Wiley & Sons, Inc., 1962, pp. 137-175.

The Wallach-Kogan* study of "intelligence and creativity" has particular importance for us because it leads, in its section on implications, to recommendations regarding different educational treatment of children with different test patterns. We find the statistical methods used to be highly questionable. We have obtained the full original data and are applying a more powerful and more correct set of procedures. Preliminary runs suggest that most conclusions of Wallach and Kogan will be contradicted by the reanalysis.

The Becker study conducted outside this project, but mentioned in the proposal, has now been completed. The study was designed to test the aptitude-treatment interaction hypothesis that in learning mathematics (number-series) Ss with superior verbal ability profit most from didactic teaching while those superior in nonverbal reasoning ability profit most from a guided-discovery treatment. Ss were selected from regions of the bivariate aptitude distribution, assigned to one of two treatments, trained using programmed materials, and tested for both direct learning and transfer. Regression of each criterion measure on the aptitude plane for each treatment was then determined and interactors were tested for significance. Results were negative; no stable aptitude-treatment interactions were found. As consultant to the Becker study, Cronbach, working with other faculty members, developed a new type of design for the selection of cases, permitting conclusions about interaction to be established with a smaller number of cases than a conventional sampling plan would require.

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*M. A. Wallach, and N. Kogan, Modes of Thinking in Young Children, New York, Holt, Rinehart and Winston, Inc., 1965.

The investigators have consulted with the similar project of Kropp, King, et al., at Florida State University and have suggested radical alteration in their data analysis and interpretation.

Experiments underway. Two experiments on specific aspects of the general questions raised above are under way. A study being conducted by Ray W. Alvord has been designed to investigate transfer effects at various stages in concept learning. One important question is whether aptitude scores predict degree of transfer. Three kinds of transfer phenomena have been postulated: "stimulus level" effects within a single task; "rule level" effects; "family level" effects (increased capacity to acquire concepts in problems of the same general type but involving new stimulus objects and rules). The study uses concept-attainment tasks of the Bruner Type. Alvord plans to administer four similar tasks followed by two additional tasks to sixth graders. The aptitude measures will presumably deal with associative memory, memory span, perceptual speed, reasoning, number facility, and vocabulary. General achievement and intelligence scores are available. The tests are being reconsidered in the light of a newly released study by Guilford. The scores will be related to indivual differences in several concept attainment measures.

Nancy Hamilton is comparing verbal and visual encoding of instructional material (cf. original proposal). In mathematics, economics, genetics, and geology, etc., instructional sequences may emphasize either visual or verbal encoding. In visual encoding, the conceptual presentation relies heavily on diagrams and pictures; verbal presentation avoids or minimizes graphic representation. It is hypothesized that the more visually-oriented instruction is beneficial for individuals facile in figural-spatial abilities, and that this instruction is less suitable than verbally-oriented instruction for individuals with verbal-symbolic facility. Instructional materials on crystal formations are being produced in verbal and more visual forms. The experiment will assess the interaction of this treatment variable with suitable test scores using both immediate learning and transfer criteria.

Experiments being planned. The next experiment being planned, and scheduled to be executed during the next twelve months, will be based on the experience gained as the Hamilton study proceeds. It will utilize instructional materials from mathematics or biology. It will seek to apply in full the general research strategy outlined in the original proposal. Two instructional treatments, one calling for verbal aptitudes and one for visual encoding aptitudes, will be developed experimentally over several iterative, small-sample tryouts. In this way, it will be possible at each revision to intensify features of the instructional programs that appear to interact with the aptitude variable. The refined treatments will then be used in a large experiment to verify the interaction. Students will be selected using tests from the ETS reference factor kit plus a simple problem-solving task in which preference for working with verbal or visual information can be observed. It is estimated that 200 subjects (100 per treatment) will be needed to obtain adequately precise regression slopes, even with the efficient design pioneered in the Becker study (see above).

A second major experiment is to be planned, for execution during the final period of the contract. This study will combine several lines of thought suggested in the original proposal. As we visualize it now, instructional materials designed as a series of parallel tasks (perhaps those mentioned earlier in this report or the materials on trees described in the proposal) would be administered under either teacher-structured or pupil-structured conditions. (See proposal.) One "aptitude" variable expected to interact here is reflection-responsibility vs. impulsivity-irresponsibility. A second such variable is constructively vs. defensively motivated students (differing on anxiety and achievement motivation). It will be possible also to investigate aspects of learning set phenomena and of the task-to-task reliability of learning rate measures in this design.

(o) Determinants of Complex Information Processing Behaviors in Children (J. E. Sieber). Ability to profit from instruction is frequently impaired by anxiety aroused by fear of evaluation. More needs to be known about (a) the effects of anxiety, defensiveness, intelligence, and gender of the learner (and especially the interactions of these latter variables with anxiety) upon various aspects of problem-solving in complex learning environments, and (b) the types of instruction which may be used to reduce anxiety at the same time that new problem-attack strategies are being taught. The present research aims to investigate these two problems.

Instructional techniques which prove successful in the reduction of anxiety in this research become candidates for more comprehensive development as technical skills of teachers. Where such techniques are already being used in some other context, as technical skills, they now need to be reexamined for relevance to the instruction of highly anxious students.

The specific objectives of the project are (a) to develop a comprehensive set of problem-solving and decision-making tasks which lend themselves readily to the study of problem-solving strategies and errors (e.g., errors of problem misperception, perseveration on wrong strategy, failure to use previously acquired information, forgetting of one's current line of reasoning); (b) to study problem-solving and decision-making in six grades in relation to their levels of anxiety, defensiveness, gender, and intelligence; (c) to determine if possible the level of physiological arousal (heart rate and respiration rate) during problem solving; (d) to administer a brief training program designed to reinforce attention to problem-relevant stimuli and to encode and evaluate such information, and (e) to determine the effects of training upon subjects' problem-solving behavior (especially in relation to their initial level of anxiety and the other organismic variables) and level of physiological arousal.

The following 2x2x2x2 factorial design is being filled by pretesting on anxiety and defensiveness and obtaining available data on IQ and sex: (a) test anxiety (two levels), (b) defensiveness (two levels), (c) sex, and (d) intelligence (median split).

A set of tasks in mental arithmetic, logic, and decision-making in a visual reconnaissance, are being administered to subjects. Dependent measures are being obtained on (a) pre-decision information search, (b) pre-decision time, (c) divergent thinking, (d) integration of information, (e) ability to make inferences, (f) accuracy of problem perception, (g) amount of memory interference, (h) ability to structure unstructured problems, and (i) anxious behaviors - e.g. self-derogation, repetitive physical movement.

At a later date, subjects will be given a set of problem-solving and decision-making tasks especially scaled and organized to yield the dependent measures listed above.

All Ss will then be given training in discriminating and verbally encoding stimulus attributes, and evaluating their relevance to the problem at hand. Ss will then be given a set of problem-solving and decision-making tasks similar to those previously administered. Differences in each of the dependent measures will be examined to determine the extent to which more thorough and efficient information processing has occurred and anxiety symptoms have been reduced. Preliminary evidence indicates that performance of the first half of the set of tasks does not alter performance on the second half of the set of tasks. To determine whether any differences between pre- and post-training Ss are attributable to mere repetition of the experiment, a group composed of 16 Ss representing each cell of the factorial design will be given the pre- and post-training forms of the test without receiving the training. If there are sizeable differences on the means of any subgroups of these control Ss, further control groups will be selected and run.

There is considerable enthusiasm in the cooperating schools. If results look promising, an experimental application of the training procedures will be undertaken. This application would involve designing and conducting a problem-solving oriented curriculum in one or more subject-matter areas, in which emphasis would be placed upon recognition of the components of problems, creating and learning verbal categories for these components, and exploring their relevance to that particular subject matter area. Emphasis would be shifted from getting the "right" answer to understanding the problem and its implications. It is expected that this procedure would increase the ability of children (especially high-anxious children) to produce "right" answers, as well as to understand the problem.

(p) Problem-Solving Behavior under Conditions Designed to Elicit Response Uncertainty (J. E. Sieber). Two converging lines of research in children's thinking deal with (a) the developmental sequence in which children learn to consider more than one alternative before making a response (e.g. Sheldon White's research on temporal stacking), and (b) ways in which children may be taught to consider many alternatives before making a secondary category. The purpose of this research is to extend, to the lowest possible grades, experiments on the effect of teaching children to discriminate the characteristics of problems, to verbally encode these characteristics, and to evaluate their relevance to obtaining a correct solution. There remains, however, an empirical gap in the literature; descriptive developmental data are not available on children's behavior under conditions in which more than one response alternative is possible. Accordingly, in preparation for extending the "teaching of discrimination training" mentioned above to lower grades, developmental comparative data are being gathered on 1st-, 2nd-, 4th-, and 6th-grade children.

Children in the sixth, fourth, second, and first grades (and possibly later, kindergarten children) will be given 14 decision problems. The response uncertainty of each problem will be determined by prior scaling. Response uncertainty varies from zero to about four bits. Seven of the problems will be presented without response alternatives from which to choose, and seven will be presented with response alternatives. The problems without alternatives will be matched, as to degree of response uncertainty, with the problems with alternatives.

The subjects will have the option of delaying decision and obtaining more information for as long as they wish. The following data will be gathered, by age: amount of information gathered, response latency, degree of differential responsiveness to varying levels of response uncertainty, effects of presented vs. self-generated alternatives, degree of conflict as measured by speed for a lower pulling response just prior to decision, relationship of decision behavior to test anxiety and IQ, and subjective uncertainty estimate with each decision.

Preliminary data suggest that younger children tend to decide on the first alternative that comes to mind or to state that they don't know, rather than search for information to produce alternatives. This tendency appears even when alternatives are presented.

(q) Readings on the Intellectual Development of Children (Pauline S. Sears). The senior investigator and three research assistants are working on selection of readings on intellectual development of children for a book in educational research (or section of one) sponsored by the American Educational Research Association. Careful selection of "classic", stimulating readings has been made, with a series of screenings by graduate students and colleagues.

2

2. Proposed Programs in the Behavioral Domain

The major purpose of research on technical skills of teaching is to identify those teaching behaviors or teaching acts which will produce significant pupil effects, and to define those training methods which will foster learning of these skills by teachers. Pupil effects are, therefore, the criteria by which the utility of the skill is ultimately evaluated; they are the starting point for conceptualizing relevant skills. The assumption underlying the research proposals which follow is that the human teacher will be instrumental in helping pupils acquire what have been traditionally called higher level mental processes, complex motives, long term goals, and significant values and philosophies of life. It is also assumed that the kinds of learning experiences which produce these achievements are non-linear, complex, and typically multi-track in the sense that the student engages in many different activities in a parallel fashion to achieve the complex learning desired.

The research proposals following are divided into three major areas: (1) those related to pupil effects of a cognitive character; (2) those related to pupil effects of an attitudinal-value character; (3) those related to teaching behaviors necessary to establish and maintain an educational relationship between the teacher and the student.

(a) Cognitive Effects

Phase 1. Research in this area begins by defining those pupil effects which represent higher order mental processes. In general, these processes include those behaviors described at the upper levels of Bloom's Taxonomy of Educational Objectives: Cognitive Domain. The initiating question is, What kinds of teacher behaviors produce such pupil achievements as ability in evaluating, synthesizing, analyzing, and application? It will be assumed that these behaviors are components in any complex learning activity, such as conducting an experiment, writing a research paper, or producing a play. Three lines of research activity will then be followed.

First, using tests (where the word "test" represents any relevant evaluation procedure, not merely paper and pencil tests) teachers will be identified who produce these effects, or components of these effects, in students. Second, using constructed situations, with content and measurement procedures specified in advance, these teachers will be videotaped over a period of time, observers will be stationed in their classrooms, interviewers will talk to both teachers and students to identify those kinds of behaviors which seem to distinguish teachers who produce these effects from a comparable sample of teachers who do not produce such effects. This research is designed to reveal as many facets of the teaching behavior as possible so that all potential antecedents of the pupil effects may be identified.

Phase 2. In the second phase, systematic experimentation with both human teachers and, where appropriate, non-human media will be conducted to identify which of the behaviors produces the desired pupil effect. In this phase a series of successive and interrelated studies will be conducted on a small scale, using few teachers, very small class sizes, and limited amounts of content. The purpose of this experimentation will be to identify those teaching acts which seem to produce desired effects with relative consistency. Essentially, these studies will be studies of teaching method, where the essence of the method consists in the activities of the teacher.

Phase 3. In Phase 3, larger scale studies on larger blocks of units with regular classes will be conducted to test the variables identified in the experiments conducted in Phase 3. This experimentation will still be highly controlled but will involve larger numbers of teachers with larger numbers of pupils. These experiments will cross-validate the earlier set and test the generalizability of what has been found in Phase 2.

Phase 4. Simultaneously with the experiments being conducted in in Phase 2 and 3, a series of studies to identify those variables which produce the desired teaching behavior will be conducted. The purpose of these experiments is to refine the training methods used to produce the teaching acts which in turn will produce the desired pupil effects. Generally the variables manipulated will be those related to modeling and reinforcement of the desired teaching behaviors. These experiments also will be conducted in micro-teaching situations so that greater control can be exercised in the analysis of the variables. By carrying these training experiments through Phases 2 and 3, both small scale and somewhat larger scale tests of their utility will be conducted.

At this point, detailed analysis has been made of a series of pupil behaviors, relevant kinds of content in tests have been developed for use by teachers to produce the behavior, small and larger scale experiments have been conducted to test both what teaching behaviors produce the effects and what training methods facilitate the acquisition of the teaching behavior. Accordingly, at this point, both the teaching behaviors and the training methods for producing them are ready for a large scale tryout. It is here that developmental research on both the teacher behaviors and the training variables is relevant. The training procedure should be developed in exportable form, relations should be established with other training institutions, and a series of training studies should be conducted in these other institutions to prepare teachers to carry out the teaching behaviors with larger numbers of students. Rather than simply use these training procedures in standard training institutions, it is probably advisable to use training institutions in which teachers acquire these behaviors under intensive training conditions. It might be advisable at this point to relate to curriculum programs such as those in the sciences which emphasize high level thinking processes as part of their curriculum development programs.

Two concurrent lines of investigation and analysis should be made while these studies are being conducted. First, an analysis of the intellectual disciplines should be made to identify those topics or areas or problems where high level cognitive processes are required. Second, those aspects of the curriculum which are likely to be programmed in other ways should be identified. Thus, the result of this program of research should be a clear delineation between those materials which are programmable and those which require the kinds of teaching behaviors which can be mediated only by a human being. This kind of analysis should be made from the beginning of the research.

No commitment is made here as to which behaviors might most profitably be studied first. Probably at least two behaviors should be studied, such as evaluating and hypothesizing, or synthesizing and analyzing, both parts of each pair being easily related to the other.

It is also assumed that the teaching strategies which embody the teaching behaviors will generally be of the dialogue character. The theoretical model here is that the teacher serves as a stimulus to evoke the desired behavior, a reinforcer of it when it occurs, and a model of the desired behavior when the teacher himself is dealing with the content material. Any strategy will be a combination of these three modes of teaching activity. The problem will be to identify those specific teaching behaviors in each mode which produce the desired behavior, and the optimum combination of them which achieves this effect. The early stages of research will be pragmatic and inductive in testing various combinations of these modes since at present little is known about optimal combinations of the specific teaching behaviors which produce the desired kinds of pupil behavior.

(b) Attitudinal Changes in Pupils

Attitudes, values, and more complex combinations of attitudes and values such as one's conception of himself or his philosophy of life, are usually recognized as orientations which significantly influence an individual's life. Historically, changes in these orientations have usually been regarded as among the most important outcomes of an education. These outcomes influence how a person thinks and feels for many years after he has forgotten the details of specific disciplines.

Little is known about how these attitudinal characteristics are acquired. Admittedly, social influences other than those present in the school are thought to be primary determinants of significant motives, attitudes, and values. However, the folklore of teaching has always included stories about the significant influence of teachers on students. Many a great man has singled out some obscure teacher as having changed the course of his life by turning his interest to the activity in which he has achieved his eminence. Also, the teaching profession seems to be sustained by the belief that it is doing more than transmitting details of knowledge.

Complex motives, for example, achievement motivation, may be determined by such factors as general cultural orientations and parent-child relations. But it is apparent that the teacher-pupil relation and its setting, the classroom, must be influential in effecting or interfering with the development of such complex motives. Further, because of discontinuities existing in our society, the child is frequently learning one set of motives through his family and community associations, while being urged to acquire other motives through formal schooling. The latter motives are assumed to be necessary for adjusting adaptively in the larger society. In such situations the influence of the school becomes critical if students who experience such discontinuities are ever to move into the larger society or avoid being merely marginal members of it.

McClelland has outlined twelve propositions which he feels deal with how to bring about the acquisition of motives (McClelland, D., "Toward a Theory of Motive Acquisition," American Psychologist, 1965, 20, 321-333.) Of the twelve propositions, several clearly can serve as principal strategies mediated by the teacher. For example, one proposition is that the more reasons a student has in advance to believe that he can, will, or should acquire a motive, the more educational attempts designed to facilitate acquiring the motive are likely to succeed. A teacher presumably is strategically located to develop and present the argumentation for motive acquisition. Although considerable work has been done on persuasion, little of it has been related specifically to motive acquisition and none of it has been directly applied to the strategies of teaching.

Another example of a proposition is that the more the person perceives that acquiring the motive is consistent with the demands of reality, the more educational attempts to foster its acquisition are likely to succeed. The links between changes mediated through school activities and the outer world are directly under the control of the teacher. Here again little is known about how to establish such links.

As a final example another of McClelland's propositions is that changes in motives are more likely to occur in an interpersonal atmosphere in which the person feels warmly but honestly supported as a person capable of guiding his own future behavior. Research on "teacher warmth" supports the long held belief that this teacher characteristic significantly influences pupil behavior. The research in the area should be continued through improved conceptualizing of what is meant by "warmth" and through linking specific teacher behaviors reflecting teacher warmth to such effects as acquiring significant motives.

It is not presumptuous to say that enough is known about the psychology of motivation to warrant attempts to develop strategies for fostering motive acquisition through the relations between teachers and pupils. The problem is to identify those specific teacher behaviors which are likely to foster such changes in pupils. If it can be demonstrated that certain ways of organizing and presenting reasons for changes in motives are effective, such ways can be translated into specific teaching skills. Some work on this problem was initiated at Stanford several years ago in experimentation with a technical skill called "set-induction." This skill was a way of introducing a topic so as to (a) link what the student knew about some other phenomena to what he was about to learn and (b) suggest reasons why it was important to learn the material. The skill was, in attenuated form, an application of McClelland's propositions about persuading by giving reasons and by relating to reality demands. Set induction probably represents a form of the kind of teacher behavior implicit in some of the propositions stated by McClelland. It can be readily broken down into a number of more specific skills, each of whose effects can be studied systematically.

It is proposed, therefore, to commit one line of research to the study of the technical skills of inducing motive acquisition. McClelland's theory of motive acquisition will provide the fundamental rationale for this line of research. Many of his propositions can be translated into a set of teacher behaviors, or technical skills, which can then be tested for their effectiveness in producing the desired changes in motivation.

The significance of this research is that, if such behaviors can be identified, they will probably also be found to be related to changes in complex systems of motives and points of view toward life. It is reasonable to assume that motives that teachers would attempt to influence are motives that form the core of life orientations; for example, acquiring achievement motives provides a base for a life style.

The research proposed below follows essentially the same pattern as that outlined for studying the technical skills related to significant cognitive effects in pupils.

Phase 1. The purpose of the research in this phase is to make a detailed and systematic study of teachers who are identified as having significant effects on the motivations and personality characteristics of their students. Although it may be true that all teachers have some influence in this respect, it is also clear that there are some teachers who are outstanding in changing pupils' ways of thinking and believing about themselves, about the world around them, and about what should be valued. It is proposed that in this phase an intensive study be made of such teachers and contrasting teachers to identify the characteristics of the teachers and their ways of behaving that seem to be influential in producing changes in their students. For example, teacher warmth, as noted above, is thought to be a characteristic significant in influencing pupils' attitudes and values towards themselves, towards school, and towards life generally. As a first step, we might begin by identifying teachers who are "warm" in their relations with students. Each of these teachers would then be studied independently to determine what kinds of effects they seem to be having on students' interests, persistence in school tasks, attitudes towards school, and so forth. Simultaneously, an intensive study would be made of the teachers to identify those behaviors which may be characterized as "warm". Again, the techniques of videorecording, interviewing, and intensive classroom observation can be used for this purpose.

Such a study would yield rich behavioral data on the characteristics of the teachers and on pupil effects. The study is necessary to determine whether what is believed about these characteristics has any basis in fact, and also to determine the chain of causality between what the teacher does and what the pupil eventually comes to do. It may be that the pupil simply believes that the teacher has had an effect upon him and there is little evidence to support his belief. The belief may be simply a symptom of the emotional character of the relation between the pupil and the teacher.

Phase 2. Simultaneously, using the presently available research findings on persuasion and similar variables, the project will develop a set of technical skills designed to induce certain motives. An example of such a skill is that of presenting logical arguments for engaging in certain kinds of actions. (As McClelland makes clear, motives are a complex of associations and actions, so that any attempt to change motives must always include spelling out the implications for action.) Similar technical skills can be developed for managing activities which would lead to acquiring relevant motives. Thus role playing activities are known to have significant influences on perceptions of relationships, yet few teachers have any technical skill in conducting and managing such situations. (Dr. Fannie Shaftel's experience in training teachers to manage role playing situations can provide a basis for developing relevant technical skills.)

The technique of simulated games has been widely used for teaching certain cognitive skills. Research suggests that such techniques can readily be adapted for use in developing interpersonal skills which would affect motives. For example, rational competitiveness based on motivation to compete could be fostered through competitive interpersonal "games" that would apply McClelland's principle concerning reality testing, establishing links to one's daily life, and the value of dramatizing the importance of self study.

Another development in the technical skills can be derived from the work of Dr. Pauline Sears on differences among teachers in evaluating a child's work; some are consistently positive, others consistently negative. Intensive study of the effects of such behaviors on a child's self-concept would entail, for example, constructing a small teaching situation requiring active participation by the student; the teacher would in one instance be positively reinforcing for any attempt to work through the material, and in the other be negatively reinforcing. The effects on the child's conceptions of his knowledge and understanding of that area and his feelings about the material being learned would be assessed. Such experiments would demonstrate the connection between certain teaching behaviors and the student's evaluation of himself.

Phase 3. Once the connection between the teaching behaviors and the pupil's motive acquisition, self-concept, and similar behaviors has been shown, attempts can be made to substantially modify teacher behavior. Here the procedures of analyzing the teacher's behavior through videorecordings and providing demonstrations via social learning techniques, i.e., modeling, can be applied. It may also be discovered that such procedures are themselves helpful but not sufficient since the teacher's style may be a function of very deep personality needs which have to be met through intensive analysis of another kind. However, recent research in behavioral psychotherapy indicates that teacher behavior can be modified by using reinforcement and social learning principles. (The work of Bandura particularly is relevant here.) Training experiments and intensive clinical work would be initiated to produce the kinds of changes desired. Such studies would also increase the capabilities of teachers who appear already to have them to some degree.

Phase 4. As in Phase 4 in studying the relation between teaching behavior and cognitive effects in pupils, once sufficient knowledge has been developed, large-scale tryout of training methods needs to be conducted to determine the generalizability of the findings.

Each of the above phases represents a sequence from (a) intensive analysis to identify relevant factors to (b) developing programs for widespread use in modifying teacher behavior. This area of research on the problem of motive acquisition commits the Center to working on a problem likely to persist regardless of changes in the teacher's role resulting from programmed instruction and the other developments discussed in Section I, Focus. Although educators recognize the importance of this function of teaching, it has not been adequately subjected to research. Progress in this area makes possible substantial improvement in teaching.

(c) The Management of Classroom Activities and Teacher-Student Interactions

Teaching requires maintaining an orderly relationship with students individually and in groups. Programmed instruction and the other developments discussed in Section I will change the character of pupil-teacher relations. Some of these innovations will create new needs; they will also solve some recurrent problems.

The new technologies will also require special skills. For example, organizing instruction in pupil groups of different size requires teachers to be able to interact with students in small groups, in tutorial relations, and in supervising independent study. The elementary and secondary school teacher will need to acquire some of the skills traditionally utilized by university professors in conducting seminars and in directing individual research.

Given also that the American school includes a highly diversified student population, some of whom are not highly motivated, teachers will continue to have problems establishing working relations particularly with adolescents. Teachers have always been concerned with the problem of "discipline". Even when teachers seem to have "adequate discipline", they often achieve it by maintaining rigid and stereotyped relations with pupils. Many teachers cannot freely interact in dialogue-discussion activities in the classroom; or they often restrict the range of interaction to a limited number of pupils.

The "management skills" required for these kinds of problems are a set of interpersonal interaction skills required in a wide variety of situations and may be largely independent of the particular subject matter being taught. Acquiring these skills is a practical and urgent necessity for beginning teachers. Without these skills, they cannot initiate genuinely educational experiences for their students. Many become discouraged and leave the teaching profession. Many of these teachers have excellent capabilities. If they could be helped to establish effective working relationships with pupils, they would make genuine contributions to education. Many experienced teachers employ rigid control that sharply constricts the student's educational experiences.

Research-based knowledge to guide teachers either in acquiring or in using management skills is inadequate. Studies in teachers' personality traits indicate that no single trait or constellation of traits insures successful working relationships. Particular techniques for "control" are based on strong beliefs which tend to be self-confirming, rather than research.

In the line of investigation proposed here, the goal is to identify management skills which teachers could utilize to establish effective working relations with students. Some work on this problem has been initiated at Stanford. Recently, beginning teachers with severe disabilities in management skills were identified and an intensive analysis of their interactions with pupils has been begun. A training program was initiated with one of these teachers who received intensive analysis of tapes of her interactions with students. The principle utilized was that she was reinforcing the kinds of behavior that were interfering with effective interaction between her and her students. Observations of her interactions confirmed a hunch that this was the relevant principle. After several hours of analysis of classroom tapes, she was able to identify the situations in which she was defeating her own purposes. Considerable improvement in her interactions was achieved.

Several lines of investigation are possible following the principle of behavior therapy. Preliminary investigations indicate that a set of skills demonstrable to teachers and acquirable by them can be identified. The research outlined below suggests the mode of attack on this problem.

Phase 1. In phase 1, the line of investigation described in the preceding paragraph would continue. Teachers with severe discipline problems would be identified, and intensive analyses of their problems would be made. Procedures comparable to behavior therapy, along with use of the videotape recorder as a means of behavior observation, will be used to guide these teachers in modifications of their behavior.

This procedure will have three outcomes: (a) intensive analyses of the problem behavior leading to the formulation of hypotheses; (b) clinical tests of these hypotheses, made in the process of helping the teacher to modify her behavior; and (c) identification of a set of situations and relevant skills.

Phase 2. In this phase, a series of experiments to test training variables will be performed. Some of these experiments will probably require some role-playing by students, but others will not. It has been demonstrated that when analyses of teaching problems are made, one can frequently identify a general teacher behavior usable in any teacher-student interaction for establishing satisfactory teacher-pupil relations. For example, in an experiment at Stanford in which teachers were trained to alternate between teacher-control and student-control of teacher-pupil interaction, role-playing behavior by students was not required. A dialogue situation was constructed which permitted the teacher to enter actively into the dialogue or to remain as a permissive leader of the dialogue. The ability of a teacher to enter into or step aside in such interactions is probably a basic skill underlying other management skills.

Phase 3. In this phase, tests of the skills will be made in two ways. First, students who have gone through an intensive training program will be followed into the classroom for detailed analyses of the effect of the training and for retraining (a procedure which should add to our knowledge of the problem area). Second, field testing will be undertaken in various forms. For example, trained teachers could be placed in classrooms in which considerable pupil disruptive behavior existed to determine the extent to which the teachers could change the situations. Or teachers having difficulties in their relations with pupils could be placed in a training program. In either case, well established principles would be utilized in testing their effectiveness in solving certain kinds of problems.

Phase 4. In this phase, training programs will be developed. They will use constructive situations and models derived from the analytic work and training programs described above. This developmental work should yield a number of prototype situations likely to occur with some regularity under known conditions. The methods for handling these situations can then be demonstrated through use of film. Programmed materials for teaching the underlying principle might also be developed.

Two examples of the kind of developmental products and programs suggested above can be seen in the film on discipline problems developed by Dwight W. Allen and in training programs developed by Dr. Bert Y. Kersh at the Oregon System of Higher Education. Both Allen's film and Kersh's program were developed on the basis of a priori assumptions about discipline problems. The analytic work described above would presumably improve such programs since it would begin with an analysis of the problem in the situation where it actually occurs. Nonetheless, both of these programs demonstrate the feasibility of products which illustrate effective training programs. A number of training films now available for psychotherapists illustrating behavior therapy in a restricted number of situations provide remarkable demonstrations of techniques and results. These films also exemplify the kinds of materials for training teachers.

While the work in these four phases has been described in terms of management skills, such a program also can be developed for other teacher activities, such as conducting small-group discussion. Robert N. Bush of the Stanford Research and Development Center has directed a project on analyses of skills in managing small group interactions. Sufficient analysis has been achieved to begin a comparable research program on this set of skills. Such a research program would follow the same general outline beginning with a first phase in which teachers who are effective leaders of discussion are observed and their behavior carefully analyzed. A second phase would consist in training teachers in the technical skills of conducting a discussion, followed by a third phase of extensive testing in classroom situations, and a fourth phase of demonstrating these skills through films, specialized training programs, and institutes.

The Training of Trainers. In all research on teacher behaviors keen observers of teacher-student interaction are required. In the technical skills experiments, the experimenter guides, directs, and reinforces certain kinds of teacher behavior. Each of these studies should identify the kinds of training behaviors that are most effective in producing changes sought.

The Center's staff has had considerable experience of this kind in the experiments conducted to date. Each of the studies should yield a cataloging of the desired training behaviors and observations of the trainers in action. For example, the training experiments should provide not only videotapes of the trainee behavior but also videotapes of the trainer behavior so that these in turn can be analyzed and experiments set up to modify and produce desired trainer behavior.

Certainly one of the major products of this line of investigation should be the development of trainers of teachers. It is conceivable that a new role in schools could be developed. Historically, the supervisor has seldom had the characteristics envisioned here. This person would be responsible primarily for evaluating and helping to produce changes in teacher behavior. This person would play the role of a consultant to teachers in continually improving their technical skills of teaching. Such persons would be readily accepted by teachers if they could provide the desired help. Their analogues exist in industry in the industrial, engineering, and training psychologists who organize and supervise training programs. They would bring about considerable improvement in in-service training programs.

B. The Personological Domain--Teacher Traits and Characteristics

The objectives of this program are to conduct research and development on the determiners and consequences of teacher traits and characteristics. Among the latter are various kinds of attitude, belief, knowledge, cognitive style, and intellectual ability. Measures of these variables are developed and validated. Results of the program should contribute to understanding of teaching, to tools for research and evaluation in teacher education programs, and to prediction of success in the teaching career.

1. Present Projects

(a) Teacher Attitudes and Their Correlates (N. L. Gage). This project has two purposes: (a) to develop methods for determining causal relationships between teachers' attitudes toward pupils and pupils' attitudes toward their teacher, and (b) to dimensionalize pupils' perceptions of their teachers.

The first objective, in which Albert Yee of the University of Texas has collaborated with N. L. Gage, has been sought through the testing of a technique (cross-lagged panel correlation), developed by Donald T. Campbell, by means of teachers' scores on the Minnesota Teacher Attitude Inventory and mean pupils' ratings of their teacher on a 100-item inventory. Both variables were measured during the first week of school in September and again four months later. Shortcomings of the technique revealed by these data have led to the development of two alternative methods: The frequency-of-shift-across-median technique and the frequency-of-change-in-product-moment technique. The rationale and results of these methods have been presented in a preliminary draft of a paper entitled "Techniques for Determining Causal Relationships between Interpersonal Attitudes" by A. H. Yee and N. L. Gage. If the methods prove to be valid they will make possible the determination of whether, for example, "warm" teachers produce pupils who are favorably disposed toward school or the influence operates more in the opposite direction, so that favorable pupils make their teacher become "warmer." These alternatives, in turn, have implications for the development of teaching methods and procedures that will result in optimal motivation on the part of pupils.

The second objective is being sought through factor analytic studies of the aforementioned 100-item inventory of pupils' perceptions of their teacher. Factor analyses of the intercorrelations of the pupils' mean scores on each of the 100 items have been performed. The raters were the pupils of 100 sixth-grade teachers in Northern California and Texas. The instrument, developed by William Beck in 1964 under the supervision of N. L. Gage, has 20 items in each of five *a priori* categories of teacher "merit": cognitive, affective, disciplinary, motivational, and innovative. Factor analyses by the method of principal components, with varimax rotation, have previously been obtained and interpreted by Beck and Yee. The present study, carried out by the Center's Unit on Research Methodology, consists in a diagonal factor analysis using a program developed in large part by Richard E. Jaeger and applied to these data by Walter Zwirner, both working under the direction of Lee J. Cronbach. A tentative report on this analysis is being reviewed as to implications for the design of instruments that would lead to improved tests of dimensionalization hypotheses. (This work is also described in the report below on the Unit on Research Mehhodology.)

(b) Cognitive Preferences in Mathematics (Robert W. Heath). This project is an attempt to extend psychological research on stylistic differences in cognition to the study of teaching. Prior research on cognitive styles has emphasized the 'learning' half of the hypothetical 'teaching-learning' process. Stylistic preferences in thinking may prove to be of significance in the study of teaching.

Our first hypothesis is that there are reliable differences among individuals in their characteristic modes of expressing mathematical ideas. If such cognitive preferences exist and an instrument to index individual differences in these preferences can be developed, the relations of these variables to other instruction-learning variable can be determined. For example, the following questions are relevant to the focus of the Center: (a) Are preferences for modes of expression of mathematics teachers related to teaching success? (b) Does correspondence between teacher and student preferences improve instruction? (c) Should teachers be trained to use different modes of expression with different kinds of students and with different mathematical topics? (d) Are preferences for modes of mathematical expression modified by institute training, technical skills training, and different practices of teachers? (e) What are the relations between preference for modes of mathematical expression and other aptitude variables for students, and for teachers? These are merely examples of studies suggested by such an instrument.

Our first task was the development of a reliable measure of the putative cognitive preferences. Thirty items have been written asking respondents (teachers and students) to choose one of three modes (verbal, graphic, and algebraic) of expressing the same mathematical idea. These items have been administered to 115 seventh-grade students in the Fremont Unified School District for test development purposes. The data from this administration are now being analyzed.

Though the test directions tell the respondents to record their own preferences, it is possible to instruct them to mark the sheet as they think their teacher would want them to respond. The difference between these two kinds of responses would, presumably, yield some information about the "fakability" of the test. The possibility of using pupillary dilatation data to evaluate relative degree of positive effect toward the three options in each item has been discussed with Robert H. Koff. If this sort of analysis is technologically feasible, it may serve as a sort of physiological validation of the psychometric approach to cognitive preference measurement.

With ipsative scores psychometric problems exist in item analysis and reliability analyses. For example, how would the generalizability model be applied to estimating the reliability of the three scores? How can one interpret the correlation between the three scale scores? How can correlations with external criteria (teaching success) be interpreted among three ipsative scores? Dr. Cronbach has suggested possible solutions to these problems.

(c) Pupilometry in the Study of Teacher Attitudes (R. H. Koff).

Historically our knowledge of individual differences in attitude formation has been largely confined to behavior elicited by paper-and-pencil tests. Yet theories regarding the process of attitude development suggest that attitudinal differences may be reflected in certain physiological response characteristics. Although the responses of the autonomic nervous system are not observable behaviorally, they can be measured with precision, and this measurement is not dependent upon verbal responses subject to purposeful distortion. It is hoped the present research will identify relationships between theoretically relevant physiological response characteristics of teachers and their attitudes toward learners and teaching, as measured by traditional means (interview, paper-and-pencil questionnaires, and behavioral ratings).

The expected results will have value in relating attitude structure to teacher training practices and in relating attitudes of teachers toward learners and teaching to their behavior in the classroom. Studies will be addressed to the following questions: How are teacher personality and attitude characteristics related to classroom behavior? (A physiological verification of the Minnesota Teacher Attitude Inventory is contemplated.) How do teacher attitudes toward students, education, and subject-matter areas change over time? What are the consequences of such changes for the teacher and the learner? How are teacher attitudes related to ability to motivate students, get students to solve problems, establish rapport, and generate enthusiasm?

The objectives of this research are to extend our knowledge of the relationships between teacher attitudes, as measured by traditional paper-and-pencil questionnaires, and an involuntary response--pupillary dilatation. The rationale for the present inquiry is founded in studies by Eckhard Hess and his co-workers* who have demonstrated that changes in the size of the pupil of the eye are related to the emotional effects of visual stimuli. Hess, Seltzer, and Shlien,** for example, found that homosexual males showed significantly greater dilation to pictures of nude males and significantly more constriction to pictures of nude females than did heterosexual males; the measurement of eye-pupil response permitted clear-cut discrimination between homosexual and heterosexual males.

In summary, research with pupilometry has operationally defined one variable (interest-disinterest) and has produced additional data which have generated speculation about several others. Our objective is to identify the relationship between subjects' pupillary responses, and several traditional criteria for assessing attitudes: behavioral ratings, personality questionnaires and interviews. The traditional criteria will serve as independent variables and pupillary response as the dependent variable.

The target population will be teachers in training and employed teachers with at least two years of teaching experience. The experienced teachers will probably be drawn from the school districts that have been designated as field stations for the Center. Teacher trainees will be students at Stanford University. Such variables as social class backgrounds, age, IQ, subject-matter specialization, and grade level of teaching will be controlled.

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*E. H. Hess, & J. M. Polt, Pupil size as related to interest value of visual stimuli, _Science_, 1960, 132, 349-350.

E. H. Hess, & J. M. Polt, Pupil size in relation to mental activity during simple problem-solving, _Science_, 1964, 140, 1190-1192.

E. H. Hess, A. L. Seltzer, & J. M. Shlien, Pupil response of hetero-and homosexual males to pictures of men and women. _J. abnorm. Psychol_., 1965, _70_ (3), 165-168.

The independent variables will be the teachers' responses to various questionnaires (e.g. the Minnesota Teacher Attitude Inventory), data from personal interviews, and behavior ratings by supervisors.

The dependent variable will be pupillary response. The technique and instrumentation developed by Hess and Polt will be used to compute a single score for each S from measurements of the diameter of the pupil of the eye in each frame of a photographic record. There are 20 frames (on the average) taken during projection of each control stimulus and 20 frames (on the average) during each immediately succeeding experimental stimulus. The score is computed as

$$\frac{\Sigma \frac{E-C}{C}}{N},$$

where E is the average diameter during any given experimental stimulus, C is the average diameter during the corresponding control stimulus, and the summation is taken over all N control-experimental stimulus pairs viewed by a subject. Despite general objections, raised by Lacey*, to the use of percentage change scores in physiological measurements, the use of percentage change to correct for individual differences in initial pupil diameter has been found to be statistically satisfactory by Parkman.**

Stimuli will consist of black and white photographs. The photographs will show situations intended to elicit attitudes toward learners and teaching.

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*J. L. Lacey, The Evaluation of Autonomic Responses Toward a General Solution, Annals, New York Academy of Science, 1956, 125-163.

**Margaret Parkman, Identity Role and Family Relations, Appendix F. Ph.D. Dissertation, University of Chicago, 1965.

The first step in our analysis will be to divide Ss into high, middle, and low groups on each independent variable and compute average pupillary dilatation changes for each group. This is the main step in the data analysis. According to the present hypothesis pupillary dilatation should be positively related to indices of attitude assessment. Further study will be guided by the results of this analysis.

For the present, the project has been concerned with the design, construction, and purchase of equipment. Preliminary work will be aimed at (a) development and improvement of technology for obtaining and scoring pupillary responses, and (b) replication of previous research to determine that the equipment is working and to coordinate data collection and scoring procedures.

Technical improvements in the equipment and the refinement of scoring procedures are underway. A Research Memorandum will probably be issued by the end of the spring quarter. Seminars have been planned to formulate additional research and evaluate present research strategies.

2. Proposed Program in the Personological Domain

The term "personality and characteristics" refers to relatively enduring dispositions to behave in certain ways, or habits of thought and action, and to those non-behavioral properties of persons, such as age, sex, and social class. The Center is concerned with these dispositions and properties of teachers insofar as they have significant relationships to the ways in which teachers behave in interaction with their students. Such variables may be cognitive or non-cognitive; they are often denoted with such terms as "attitude", "values", "interests", "adjustment", "needs", and various kinds of cognitive ability and skill, such as problem-solving ability. The chapter on "The Teacher's Personality and Characteristics" by Getzels and Jackson in the Handbook of Research on Teaching exemplifies clearly the concerns of this program. Although, as that chapter indicates, much research has been done along these lines, additional work of great potential significance remains to be done. The Center plans to expand and strengthen its program of research and development here.

(a) The Collection of Research Instruments. Concurrently with its own instrument development, the Center will collect as many as possible of the instruments for the measurement of teacher personality and characteristics that have already been prepared by research workers. Much research has been conducted with instruments not primarily intended for the measurement of teacher personality and characteristics. But a number of instruments, such as the Minnesota Teacher Attitude Inventory and Stern's Activities Index, have been designed primarily for use with teachers. The collection and study of these instruments would serve not only the Center's research but, if made available to research workers elsewhere, would significantly improve the likelihood of significant advances in such work. The Center's current project on reviewing the research on teacher behavior and characteristics will be continued and extended and will be based in part on this project on the collection of instruments. A compendium analogous to the Mental Measurements Yearbooks will be prepared to bring together information on, and evaluations of, instruments for the measurement of teacher personality and characteristics.

(b) A Testing Program for the Stanford Teacher Education Program. The Stanford Secondary Teacher Education Program now admits annually approximately 150 students, who enter in June immediately after receiving a bachelor's degree in one of the secondary school teaching fields. These students go through the microteaching clinic as well as take certain courses during the summer quarter, and work as interns in a secondary school during the subsequent school year. The Secondary Teacher Education Program will be used as the site for research on teacher personality and characteristics. The Center will (a) administer a battery of tests to all of these students upon their entrance into the program in June, (b) collect data on the performance of the students in the microteaching clinic and in their internship, and (c) determine the relationships between the scores on the entrance test battery and subsequent performance. Analysis of these data will throw light on the differences in personality and characteristics of the students in the various secondary school teaching fields and on the predictive validity of the various instruments of the test battery. Present plans call for the use of the Graduate Record Examination, the Minnesota Teacher Attitude Inventory, Stern's Activities Index, and an inventory of beliefs and opinions about teaching methods already prepared in draft form by N. L. Gage and M. Weitman. Approximately a full day of the student's time will be used for the administration of this battery. A U.S.O.E. post-doctoral research fellow, Professor Roger Wilk, broadly experienced in the administration and analysis of test batteries for student personnel work in teacher education, will be able during the academic year 1967-1968 to participate in this project.

(c) Development of an Instrument for Students' Descriptions of Teachers.

Students' descriptions of their teachers have unique values as data in research on teaching. The sources of the descriptions, namely, students, have abundant opportunities to observe the teacher in action. Mean ratings or descriptions by students of their teacher are almost always found to be highly reliable in the sense that within-class vaiance is less than between-class variance. And such ratings have often in the past been found to be significantly related to measures of teacher personality and characteristics, for which they can serve as criteria.

Many instruments for the collection of students' descriptions of teachers, in the form of rating scales and inventories, have been developed. A considerable number of factor analytic studies of these instruments have been performed. In this project, these instruments and the findings obtained with them will be reviewed and analyzed. Work already begun on the factor analysis of the Gage-Beck "About My Teacher" inventory, consisting of 100 items categorized a priori in terms of five types of teacher merit (affective, cognitive, motivational, disciplinary, and innovative), will be continued. Current factor analytic studies show promise of leading to an improved dimensionalization of teacher characteristics, as described by students.

In addition to applying factor analysis, this project will seek to go beyond the overall evaluative dimension in students' perceptions of their teachers by means of forced-choice technique, in which alternatives equal in social desirability must be selected by the student. This approach should make possible the description of teachers along dimensions other than the general overall evaluative attitudes of the students toward their teachers. The instruments developed in this project will, of course, be useful in the collection of data to be related to those collected in other projects of the Center.

(d) Development of a Multi-dimensional Inventory of Teacher Attitudes and Beliefs. The most frequently used measure in contemporary research on teacher attitudes is the Minnesota Teacher Attitude Inventory. Typically regarded as a measure of teacher "warmth," the MTAI has recently been subjected to several factor analyses that show it to be moderately multi-dimensional, in the sense that identifiable nonorthogonal factors emerge. Further, the MTAI is readily fakeable once its underlying orientation is known, and its concurrent validity against measures of the teacher's effectiveness in getting along with pupils has been disappointingly low (about .25) in more recent studies, as compared with the coefficients of about .45 obtained in earlier work on the MTAI during the 1950's.

The present project will be aimed at developing an improved instrument, one that will measure attitudes and beliefs significant not only for the affective but also for the cognitive influences of teachers on their students. Further, since the MTAI was prepared for and has been found to be valid only for teachers in the middle elementary grades, the development of an instrument that has validity for secondary school teachers seems to be called for. The application of recent advances in test construction technique -- in the form of forced-choice item formats, improved methods of item selection and validation, factor analytic technique, improved understanding of response sets and other cognitive styles -- make an effort to develop improved inventories highly promising.

In addition to the relatively well-defined variable of "warmth" -- which has been analyzed in various ways by Solomon Asch, Harold Kelley, Ned Flanders, David Ryans, Morris Cogan, and others -- the project will explore a number of other types of needs, interests, values, and belief-systems that seem promising as correlates of classroom behavior, longevity in the teaching profession, ability to teach culturally deprived students, adaptability to innovations such as computer-assisted instruction, and other variables.

(e) The Validation of Teacher Personality and Characteristics Against Classroom Behavior. Although the pertinent hypotheses are plausible and straightforward, correlations of measures of teacher attitudes with teachers' actual behavior in the classroom have been studied only infrequently. McGee obtained a correlation of .60 between California F scale scores and ratings of teachers by classroom observers on a dimension of democratic-authoritarian behavior. Comparable studies in which teacher behaviors are actually counted and tallied, as in Flanders' technique, rather than rated, should be made. This project will undertake to determine the value of various measures of teacher personality and characteristics for predicting the ways in which teachers behave in the classroom. These behaviors will be described by means of schedules applied to videotape recordings of classroom teaching.

C. The Institutional Domain -- Teaching Roles in Their Institutional Setting.

This program consists in research and development on the teacher's role as it is affected by social and technological changes in the society at large and by the social and administrative forces operating in the school district and in the individual school.

1. Present Projects.

(a) The Teacher in 1980 (R. N. Bush). The Center from its beginning has been attempting to improve understanding not only of how teaching currently takes place and how it can be improved, but, also to discern how teaching is likely to be affected by and how it can take full advantage of the fruits of modern technology, new discoveries in the behavioral sciences, and changes in our society. To help shape the role of the teacher tomorrow, we need today to fashion the requisite training programs and settings where the study of teachers in their new roles may be undertaken.

Beginning in November, 1966 with a series of exploratory panel discussions, among members of the Center staff, the University faculty, and educators from the Far West Laboratory, selected Supplementary Educational Centers, school systems, the California State Department of Education, and other selected participants, we have been engaged in discussion of the likely shifts in the role of the teacher over the next two decades. The following outline of topics to be considered in Center seminars over the next nine months reflects the forces which we wish to take into account in studying teaching and the role of the teacher:

1. The Changing Cultural Milieu
    - a) The World of Work
    - b) Leisure
    - c) Urbanization
    - d) Family, Religion, and Individual Identity
2. Mass Communication

3. The School and Technology
    - a) Computer Assisted Instruction
    - b) Data Processing
    - c) Information Retrieval
    - d) Television
    - e) Films
4. Shifts in Locus of Government Influence
5. Shifts in School Organizational Structure and Function
6. Curriculum and Instructional Systems
7. Evaluation
    - a) Instructional Programs
    - b) Pupil Performance
8. Shifts in Characteristics and Training of Teachers
9. Shifts in Teacher-Pupil Interaction Patterns.

Members of the Center and University faculty and other educational leaders will be invited to prepare seminar papers for discussion by the professional staff of the Center.

Taking 1980 as a reference point, each invited participant will address himself to the central questions of what are the possible impacts of changes in the field to which he has been asked to address himself on the role of the teacher and the act of teaching, and what are the implications for research and development in teaching. Each participant is being asked to submit his paper in advance and then to spend a minimum of two days on the campus meeting with Center personnel. A seminar focusing upon the discussion of the paper will be held. The number in attendance will be limited to the 15 or 20 senior staff members of the Center. The remainder of each invited participant's time will be spent in consultation with various staff members, meeting with different task forces, and exploring issues pertinent to their specific research interests. Thus, once or twice each month, over the next year, the working members of the Center staff will be engaged in the discussion of new social and educational developments, their likely impact on the teacher's role, and their implications for research and development activities. At the conclusion of this series, the major papers of the discussion will be prepared for publication and distributed to other Centers and to interested persons engaged in the study of teacher behavior and teacher education.

(b) Organizational Context of Teaching (N. J. Boyan and G. W. Sowards). The work of the teacher is increasingly conducted in schools that may be characterized as complex formal organizations. Studies of organizations such as business enterprises, industry, governmental bureaus, and hospitals suggest that teaching is inevitably influenced by the organizational context in which it occurs. Because research on this context is limited, investigations are needed to determine the effects of selected organizational and structural variables on the behavior of teachers.

This initial project was intended to identify organizational elements which influence the decision-making behavior of classroom teachers. Specifically, an effort was made to determine the extent to which teachers would identify organizational context elements as influences on: (a) the aims they would try to achieve, (b) the content they would select to use, (c) the methods they would choose to employ, (d) the evaluation procedures they would use, and (e) the class management/control procedures they would use.

Secondary objectives were to obtain some indication of the ease with which teachers would talk about the organizational context of their teaching, test a list of elements in the organizational context for inclusiveness (presumed to be influences) against what teachers would identify, and determine the data-gathering procedures which this kind of inquiry requires.

Data were collected in the Spring of 1966 by interviews and questionnaires from 32 classroom teachers selected from school systems in the San Francisco Bay Area. Of the teachers, 16 were drawn from elementary schools and 16 from secondary schools, on the assumption that schools at these two levels provided different organizational context settings in which to teach. Half the teachers at each level were drawn from schools conventionally organized and half from schools using a modified organizational arrangement (e.g., team teaching, flexible scheduling). Finally, selections were made so that half of the teachers at each level and in each type of school were first-year teachers and half were experienced teachers but new to the system in which they were teaching; it was judged that these two kinds of teachers would be especially sensitive to the influences of the organizational context on their decision-making behavior.

Each teacher was interviewed at the school site twice within a three-month period. The interviews were tape-recorded and transcribed for analysis. Just before the close of the school year, a questionnaire was mailed to each subject for return to the investigators. Of the 32 subjects, 29 returned the questionnaires, and these data were recorded for analysis. Teachers were asked to respond to questions concerning those persons or things which influenced their usual decision-making in the areas already mentioned. They were also asked to indicate which persons or things they would use for confirmation and support if their decision on any of these matters were challenged. The interview sessions were open and the teachers were free to respond as they desired to a series of questions focused on each of the five decision areas. The questionnaire contained more highly structured questions, which required (a) ranking for each of the five decision areas, a list of possible sources of influence on teacher's decisions and (b) indicating the most probable extent of influence on decisions that they would ascribe to these several sources.

Date from the interviews and the questionnaire were then examined separately and in relation to each other in a search for patterns suggesting the effects of organizational context on the decision-making behavior of teachers.

The sample of 32 teachers permits only tentative conclusions that may identify next steps in this line of inquiry. (a) Teachers are influenced by a set of organizational context elements as they engage in decision-making about teaching. (b) Teachers tend to be influenced by these organizational elements secondarily. That is, they are prone to look first to their own cumulative experience, to the types and kinds of pupils they have known, and to the results achieved with these pupils, as a basis for decision-making. It would appear that they look to other sources of influence only after they have tried to decide for themselves. (c) Teachers new to their work are apt to be influenced initially by available guides and manuals, by colleagues, and by superordinates (principals, department heads, etc.). But they seem to move rather rapidly to a reliance on their own cumulative experience, meager though it may be, as a basis for decisions. (d) Teachers appear to be pupil-oriented in their decision-making behavior. They seem to take the needs of pupils as a point of departure. (e) Teachers may be directed by some generalized conceptions of what is proper rather than by policies and recommendations integral to a particular school system. (f) Teachers seem to be more organization-oriented in the "determination of aims" than in the other decision areas, but even here their own experiences weigh heavily. (g) Teachers rely on their own cumulative experience to select the combination of content and method they use, and defend their decisions on results achieved. (h) Teachers were least able to talk about decisions, and influences on decisions, in the area of evaluation. (i) Teachers rely first on their own experiences for decisions on pupil control, but seemed more ready to consult with the principal, the counselor, deans of boys or girls, or psychologists on this problem than on others. (j) Teachers seem to place colleagues high as an influence source. This tendency was especially evident in the response of teachers who were members of teaching teams. (k) Elementary school teachers seem to use the principal in much the same way that secondary school principals use the department head. (l) The principal was consulted less in elementary schools organized on a team basis than in conventionally organized schools. Examination of these data continues. But attention is now beginning to shift to the next phase of this project, in which rigorous effort to carry out a systematic study of structural effects on a much larger sample of teachers will be considered.

This preliminary investigation has supported original expectations about the interplay between teaching and the organizational context in which it takes place. This interplay is a phenomenon which teachers and school systems will allow us to investigate. A number of variables in the organizational or institutional context of teaching show promise of being significant.

Some problems encountered in this investigation will loom larger in subsequent investigations. Trained interviewers are needed. Access to subjects for fairly extended periods of time is needed and perhaps will require that the teachers be paid for their time. The interview tapes should be transcribed without undue delay. Finally, the project needs a research associate with training in sociology and organizational analysis. The efforts being made to employ such a person are most important to further work in this area.

2. Proposed Program in the Institutional Domain

It is clear that teaching does not--and surely should not!--take place in a vacuum. While the Center is mainly concerned with individual teachers and their effects upon pupils, individually and in groups--these constituting the first (behavioral) and the second (personological) domains of the Center--powerful institutional and societal forces operate on teachers and pupils and vitally affect the results of schooling. The simplest way to describe this third part of the Center's program is to state that it deals with the conditions which surround the teacher as he goes about his work with pupils in the schools: with the institutional forces, both in school and in the larger environment, which bear upon him and his pupils.

The two operational parts of this program--only one of which was in the original proposal--are the Teacher in 1980 project, and the organizational context project of Professors Boyan and Sowards, with the assistance of Professor Scott from the Sociology Department. In addition to these two projects, we contemplate adding three lines of endeavor to this part of our program.

(a) The Teacher in 1980. This project will continue over the next twelve months by which time it should have been brought to a conclusion.

(b) The Organizational Context of Teaching. This investigation has just concluded its initial exploratory work. The chief problem facing this program is the loss of one of its initiators and prime movers, Professor Boyan, who has taken leave to work for the U. S. Office of Education. Also, Professor Scott of the Department of Sociology is on leave. Hence the responsibility for the project falls upon Professor Sowards, whose interests continue but whose new interests may lessen the time he will give to this work. However, the Center intends to pursue and even extend the organizational context work during the next few years.

In the organizational context study, the main initial point of entry has been the study of decision-making on the part of teachers. Attention to the professional decision-making process of the teachers is pivotal. The technical skill side of teaching behavior which we have emphasized needs to be balanced by the professional decision component which has received less attention until now in the Center's work. While professional decisions will be the subject of attention in all three domains--the behavioral, the personological, and the institutional--it has received most attention in the latter area. We intend in the next few years to delineate the kinds of professional decisions that a teacher is required to make and the influence upon them of institutional and personal forces. This task should be easier because of our successful experience in delineating the more specific and less complex technical skill side of teaching behavior.

Schools originally and traditionally have been organized along a line and staff pattern similar to that followed in business, military, and government, where employers, authorities in superior positions, supervise and direct the work of less skilled personnel. As teachers gain more professional status and competence, the shift to a form of organization more appropriate to the work of a professional will not take place without serious dislocations. An increased demand for autonomy on the part of the teacher, other rises in teacher militancy, and the consequent disturbance of relationships with administrators are already symptomatic of the shift taking place. There is need for better delineation of the place of the professional in a bureaucracy. We anticipate that the organizational context studies will move in the direction of understanding this process and of formulating ways in which professionally competent persons are able to enhance the quality of their educational service without the organizational structure impeding the process.

The Center now projects three additional lines of work in the institutional domain: (c) organizational flexibility in the school and differentiated use of the teaching staff; (d) the professional socialization of the teacher and his career development; and (e) a configurational analysis of schools organized on a more open and a more closed system.

(c) Organizational Flexibility and Differentiated Teaching Staff. "Yes, but it can't be scheduled," is the widespread lament of teachers and principals in objecting to the proposition that the new methods and curriculums of recent years should be tried out in the schools. The American high school became frozen into a rigid time schedule and system of grades and credits about the turn of the century. Beginning in 1958, the Stanford School of Education, through its secondary education program, sought the collaboration of the industrial engineers in the University to see if computers could be harnessed to schedule the school program. At about the same time, the faculty concerned with curriculum and teaching in the high school began consideration of what would be possible by way of a new and better educational program if the scheduling constraints could be removed. As indicated in the first section of this report, these ideas have been set forth in a monograph entitled A New Design for High School Education: Assuming a Flexible Schedule. One key idea in that statement is that a more highly differentiated staff is required if teaching is to be more efficient. The technical problems of developing a computer-generated schedule have now been solved. We can now, literally, get the schedule out of the way. Building upon this work at Stanford, the Center intends to explore more fully and systematically how teaching and learning may be enhanced in selected schools with this newly found freedom. We shall work with regional educational laboratories and supplementary education centers to distribute the procedures for flexibly scheduling schools and study what happens when the organizational structure becomes more flexible and the principle of a differentiated teaching staff is applied. This endeavor may exert a major influence in opening the schools more readily to experimentation and to study of the results of such experimentation. The vocational education section of the U. S. Office of Education, the Ford Foundation, and the Kettering Foundation have supported work along this line at Stanford. Hence the Center's efforts will be enhanced with added funds to carry forward the work. A most important outcome expected from this project is a much more efficient use of the teachers now available.

(d) The Professional Socialization of the Teacher and His Career Development. But almost as much of a vexing problem as the effective use of existing teachers is the supply of well qualified teachers coming into the schools. The conditions are depressing: large numbers of those who aspire to teaching never enter training; the majority who train never begin to teach; and the substantial proportion who enter soon leave. The teacher drop-out may be as serious as the pupil drop-out problem, and they may not be unrelated. The Center, in its original proposal, recognized the problem and indicated its intention to work on it. Nothing happened in the first year. We plan in the next few years to launch some longitudinal studies of young persons who are just beginning their training, to follow them carefully through their training and out into the schools during their first few years of teaching. We hope to ascertain how the process of professionalization takes place, to discover what may be done to lower the drop-out rate, and to increase the quality of professional insight and attitude which the young practitioner acquires in the process. The discovery of what goes wrong and what goes right in these impressionable "formative years" may be most important.* These studies may provide important clues to improvement of conditions in the institutional setting in which teaching takes place.

(e) A Configurational Analysis of Schools Organized on More Open and More Closed Systems. A new project proposed by an anthropologically trained research and development associate is that of making a configurational analysis of contrasting schools of the new open variety and those that are organized and operated along more traditional lines. Many improvements in communication patterns among teachers and pupils, in motivation and interest, and in co-operative endeavors have been claimed for these new schools. Unfortunately, little evidence exists. This line of inquiry will be related directly to the flexible scheduling and differentiated teaching staff efforts described above.

From the foregoing it may be seen that we anticipate expansion of the institutional domain of the Center's work. Although we intend it to remain a minor rather than a major program of the Center, its bearing upon our major program on teacher behavior will be of increasing importance over the next few years.

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*R. N. Bush, "The Formative Years," The Real World of the Beginning Teacher, New York, NCTEPS, June 1965, pp. 1-14.

III. Facilities and Services

The essential purpose of the Center's facilities and services is to assist the research and development activities of the Center. The tools and instruments of research, the analysis of design and data, and provisions for entree to research sites and populations are all services which this program provides and which are integral to the operation of the Center.

A. Unit on Research Methodology (L. J. Cronbach)

The unit continues to provide consultation services on research design and data analysis in the Center. To meet increasing demands for services, the Unit has been augmented. Professor Janet Elashoff, who received the Ph.D. in mathematical statistics at Harvard University in 1966 and who was recently appointed assistant professor in the School of Education, has been employed on a half-time basis at the Center. A statistical clerk has also been added to the staff and a search is being made for a full-time programmer. The last quarterly report described work performed by the Unit in connection with several Center projects. This report will note progress made with those projects and describe action taken with additional projects.

1. Technical Skills in Teaching: Explaining Behavior (Gage and Rosenshine) The Unit was called upon to help evaluate a measure of teacher explaining ability used in this project. The problem was reconceptualized as one of generalizability, and a multifacet analysis of variance components was executed. A memorandum on this analysis has been prepared, and a member of the Unit is participating in the planning of further research on ability to explain.

2. Technical Skills in Teaching: Foreign Language Instruction (Rinne) Members of the Unit consulted with the staff of this project on the design of several experiments. A rating scale based on the "Performance Criteria for the Training and Retraining of Teachers of French" is being developed. Preliminary data were collected. Analysis of these data indicates that a revision of the rating scale is necessary.

3. Teacher Attitudes and Their Correlates (Gage) This study is based on sixth-grade pupils' ratings of 100 teachers on 100 items representing, in equal numbers, five a priori dimensions of teacher merit: cognitive, affective, disciplinary, motivational, and innovative. A conventional, principal components, factor analysis followed by varimax rotation had been performed on these data prior to establishment of the Center. A different approach, intended to test the a priori hypotheses built into the instrument, is being taken by means of diagonal factor analysis.

4. Technical Skills in Teaching: General (McDonald) The staff of the Unit has consulted with the technical skills project on the analysis of data from studies now being conducted. Consideration of design problems in future studies suggested construction of composite response variables.

5. Language Pattern Training and Reading Comprehension (Politzer and Rinne) The Unit has assisted in the development of several measuring devices (Pattern Awareness Test, Sentence Comprehension Test, Vocabulary Test). Members of the methodology unit are consulting with the project staff on the design of statistical analyses for this project.

6. Organizational Context of Teaching (Boyan) The Unit has undertaken the analysis of data from measures of the intrinsic and extrinsic job satisfaction of teachers. Scores on these measures are being compared to raters' appraisals of teaching competence.

B. Microteaching Clinic (D. W. Allen)

This facility is aimed at development of the microteaching approach for teacher training and also serves as a vehicle for research. During the summer of 1966, intern teachers were trained in technical skills of teaching and practiced these skills in the microteaching clinic. During the autumn quarter, the data from the summer microteaching clinic were analyzed. A report on the effectiveness of the training in these technical skills was presented at the meetings of the American Educational Research Association on February 18, 1967.

Microteaching Workshop. A workshop on microteaching will be held during the week of July 24-28, 1967. The workshop will be designed for personnel in universities, colleges, and school districts interested in the use of microteaching for teacher education. The workshop will explore ways in which microteaching can be used to train, evaluate, and select teachers. Some of the topics to be considered are (1) research possibilities, (2) definitions of technical skills of teaching, (3) new supervisory models for helping' to change teacher behaviors, (4) "reteach" opportunities for the practice of newly learned skills, and (5) prediction of effectiveness for employment purposes.

Peace Corps Use of Microteaching. An attempt to apply microteaching techniques in a somewhat different context was made during the summer of 1966, with the Stanford-Phillippines Peace Corps Training Project. While the format of microteaching remained relatively unchanged from that used in Stanford's Secondary Teacher Education Project, a number of new factors were involved. First and most significant, the trainees were preparing for roles in elementary level teaching, and the students, who scarcely spoke English, were between the ages of five and thirteen. Second, the techniques being emphasized represented a previosuly untried set of technical skills, those unique to teaching English as a second language.

Some of the significant conclusions drawn from this venture were: (1) Microteaching, as expected, can be applied to training for the elementary level with apparent success, as judged by the participants. (2) Some of the general technical skills of the Secondary Teacher Education Program (reinforcement, varying the stimulus, use of redundancy, etc.) seemed relevant in spite of the different ages of pupils and the highly specialized teaching focus. (3) The microteaching technique required each Peace Corps staff member to clarify and focus on specific teacher training objectives far more than would have been necessary without the microteaching. (4) The teach-reteach model, in the opinion of some of the Filipino staff, even without the support of videotape apparatus, is worth trying extensively as a pre-service and inservice training technique for all teachers in the Philippines.

The Peace Corps Philippines Training Project scheduled for the summer of 1967 will again use microteaching as an integral part of its training technique.

Microteaching Film. A 30- to 45-minute film on microteaching is now being made by the Unit on Film Production under the direction of David Coffing. The purpose of the film parallels that of the microteaching workshop described above. The film will focus on the rationale of microteaching, its potential for pre-service and inservice training and its uses in research. The film will be used as a basis for discussions of the potential of microteaching in groups considering the use of microteaching or already using it in limited ways.

C. Unit on Videotape Operation (D. W. Allen)

Videotape procedures make possible more efficient and meaningful research activities and, more specifically, fulfill data recording, feedback, and storage functions in various combinations. The Unit provides resources to assist the various substantive projects in the Center and has thus far been involved in the various technical skills projects, role-playing studies, and various pilot studies. During the past year approximately 2,000 videotape recordings have been made in approximately 40 schools in the San Francisco Bay area. All recordings were related to research projects of the Center. In addition, approximately 1,500 recordings were made in conjunction with the microteaching format as it relates to research on teaching. New equipment acquired during the year includes eight complete videotape recording units and related equipment and three playback stations.

Generally the operation has been successful, a conclusion based on the following considerations: (1) The ability to record and to store data on videotape has introduced a degree of flexibility into the over-all research program by allowing the Center to carry on various research projects at the same time. (2) The increased use of the videotape operation in Center research projects is indicative of a growing realization that this medium has definite advantages for research in teaching. (3) The increased interest shown by other colleges and universities in the possibilities of videotape operations also indicates that this medium is perceived as valuable in teacher education and in research on teaching.

Problems which the operation experienced in the past year were both logistical and technical. There was a continued shortage of tape; the need to store and maintain data recorded during one study removes a number of tapes from use until such time as they are released. It seems imperative to have an adequate supply of videotapes for each study so that the taped data can be saved indefinitely. Another limiting factor is the lack of vehicles for transporting equipment to and from various schools. To complete the research projects planned for the coming year, at least one more van is necessary. Two vans would allow greater flexibility in the deployment of videotape recording equipment. A third problem arises out of the location of the Research and Development Center at some distance from the videotape project in the School of Education; the result is inconvenience, delay, and added expense in the use of videotape in connection with research projects. A technical problem of machine compatibility has arisen from lack of standards in the videotape recording industry. Because recordings made on different machines are not always interchangeable, the complexity and expense of the operation are increased.

D. Learner Monitored Teaching Facility (D. W. Allen)

In November 1966, Dr. Robert Mager of the Fundamental Research Laboratory, Xerox Corporation, delivered a number of addresses at Stanford University. During his visit he reported an unusual technique using audio, video, and other electronic devices for creating programmed instructional materials. We believe that this technique, with certain modifications, may be of value when applied to teacher training and learner research.

Basically, Mager has developed a means for simultaneous involvement of his entire staff in the problem of creating effective programmed instructional material in a relatively short time. This staff included such specialists as an illustrator, photographer, a frame composer, as well as at least one member of the population for which the program is being prepared.

The physical plant of his program-creation laboratory consists of a central "control" room and a number of small "satellite" rooms. Each satellite room contains, in addition to a video monitor, an intercom and a signal box with switches that lead to a master panel located in front of the controller and out of sight of the SMS. Each switch on the box corresponds to a standardized comment. ("I don't understand", "Repeat", "Slow down"). When a switch is pushed by a staff member, a light appears on the controller's panel indicating the comment and the person who made it. Within the central room, Mager (the controller) interrogates a "subject matter specialist" (SMS) in the field in which the program is to be prepared. The questioning of the SMS is broadcast simultaneously to each of the satellite rooms by closed circuit television. A member of Mager's staff is located in each satellite room. During the questioning, the staff members direct comments and suggestions to the controller by way of an intercom and an electronic signalling device.

Initially the controller finds himself in a very complex situation. Not only must he question the SMS, but he must at the same time scan his control panel, listen to the comments of his staff, and satisfy their requirements. Mager has indicated that the first attempts at this task can be extremely trying and often result in confusion and a breakdown of the system. But, most important from our standpoint, it has been Mager's experience that after a few sessions as controller, he begins to anticipate the questions and comments of his staff. This anticipation allows him to direct the SMS in a manner which keeps the staff feedback at a manageable level and evokes the required information for the construction of the program. Mager's conditioning to anticipate his staff's requirements may not reflect merely his own ability to absorb the cognitive demands of a number of fields of expertise; rather, it may be attributable in part to a form of affective sensitivity learning.

Suppose in place of the program controller, an intern teacher is placed in the control room and a student in each satellite room. The intern questions an SMS on "Inflation" for example. Will the intern, after a number of sessions, gain insight into student thinking? Will he begin to anticipate the types of questions his students ask? On the other hand, will the student who has been in constant communication with the teacher, learn appreciably more, then he would without this involvement?

These questions can be explored with what we call the "Learner Monitored Teaching Device" (LMTD). Many alternative arrangements of this device could be tried. The intern teacher could attempt to teach a lesson while serving as a controller, with supervisors in the satellite rooms. Doctoral supervisors could be placed in the satellite rooms while intern supervisors, as contributors, could counsel interns.

A limited pilot study along these lines has been recently completed by a group of interns. A number of high school students were told that they would individually receive a live television lecture. Half of the students (Group A - experimental) were given a signal box similar to the one used by Mager's staff. They were placed in individual rooms and were told that by moving switches on the box they would inform the teacher of their desires and that he would attempt to alter his lecture accordingly. The other students (Group B - control) were also placed in individual rooms but were simply told to watch the lecture. The lesson itself was actually a videotape and, thus, the signals of group A had no effect on the presentation. However, an effort was made while preparing the tape to anticipate at least some of the Group A requests. Interviews with the experimental group members after the treatment indicated that, while there was a certain amount of frustration caused when signals went unanswered, few of the group suspected that the lecture was not live.

Preliminary results of the pilot study, based on test scores attained by each group, suggest that the students who involved themselves in the teaching of the lesson, though artifically, tended to learn more than the students who merely watched the lecture.

During December 1966, in cooperation with the Stanford School of Education's Television and Audio Visual Center, plans for the construction of an LMTD were prepared by Center staff and arrangements for physical facilities were made. Rooms presently used by the Audio Visual Center (Viewing Rooms A, B, C, D, E-2 and C-2) can be readily adapted to wiring and circuitry needs for LMTD. These rooms will meet the requirements for the control room and at least six satellite stations. Closed-circuit television requirements can be met by the addition of six nine-inch monitors, a signal synchronizing generator, and a signal processing amplifier for proper signal distribution to the satellite rooms. An auxiliary camera (already owned by the Center) when driven by the signal generator can be incorporated into the LMTD. The student responses from the satellite rooms will be recorded on IBM dictating machines to permit easy transcription of the dialogue.

The signal network is currently under construction. Six satellite room signalling boxes are partially completed. These boxes contain a two-way speaker-microphone, six two-position switches which lead to the control center master panel, and twelve signal lights which may be actuated from the master control panel. The controller's master panel is also near completion. Six rows of twelve lights and six two-way switches are arranged on this panel, each row corresponding to one of the six satellite signalling boxes. Next to each light is an electric counting device which will record the number of times the light is signalled from a particular room. A running count of the number of times a light has been signalled on all six rows in indicated by a cumulative counting device.

Audio communication between the controller and the satellite rooms will be one-way, the controller receiving comments from the outlying rooms. These comments (ordinarily reactions that cannot be expressed by signal light) will be recorded on the IBM dictating machines. The master panel is being constructed so that the controller may listen to comments individually or so that he may throw the communication links open to two, three, four, or more of the satellite stations at the same time. Assembly of the LMTD signal boxes and master control panel should be completed by late March 1967.

Mager's approach to the creation of programmed learning materials has suggested a tool for observing the effects of immediate feedback and direct involvement in the student-teacher situation. As a teaching device, LMTD may serve to acquaint the intern teacher with the pattern of thinking of students and will also provide immediate visual feedback for improving lecturing technique. With experience in using the basic equipment, a considerable number of applications will, it is anticipated, suggest themselves.

E. Field Stations and Teaching Clinic (R. L. Warren)

The concept of "field station" is that of a research site at which much of the Center's research activities can be carried out. Such field stations should exert an integrative influence on the work of the Center. It is assumed and planned that common research sites will provide increased opportunities for examining the immediate and potential interrelationships of Center research projects. The field stations should also facilitate the enlistment and utilization of subjects and the accumulation of background data relevant to a variety of research projects.

The administrative unit that seems most appropriate to the idea of a field station is the school district. Center personnel, after careful comparisons of districts in the area, have concluded that the Palo Alto Unified School District, in which Stanford is located, and the Fremont Unified School District, encompassing a rapidly growing city across the Bay, provide two valuable but quite different research sites. The leaders in both districts have recently been approached with our proposal that the Center and the two districts develop an informal working relationship and in the months ahead examine the mutual benefits which accrue. The Center and the two districts have appointed research coordinators to work toward these goals.

There is already evidence that the relationship will prove beneficial to both the Center and the districts. One pilot study has already been conducted in the Fremont District; arrangements for this study were made by the District's research coordinator. The Fremont District is also making plans to provide office space for use by Center personnel as research activities in the District develop. Discussions have also been held with the superintendents of both districts concerning the kind of data which the districts might make available to the Center and which the Center might feed into the districts as an outgrowth of research activities.

It has been agreed that the arrangement should be informal and unpublicized, developing through the interplay of the needs and interests of the Center and the districts. To this point, no problems have been encountered; it is possible, however, that Center research will place sufficient demands on the time of district personnel as to require their reimbursement.

Previous reports on field stations have dealt with the possibility of establishing a teaching clinic, designed to help teachers and administrators who want to introduce new educational practices into their schools and classrooms and to give Center staff experience with the problems of introducing innovations. Clinical teams from the Center would be formed to work with administrators and teachers in refining, implementing, and evaluating innovative proposals; such teams would work primarily with school personnel in the field stations. But no progress has been made. The value of the clinic as a Center project is still under discussion. As research activities develop, the time and personnel available in the Center to participate in such a clinic may be too limited to warrant its development.

F. Unit on Library and Bibliography (R. W. Heath and Dorothy Smith)

The objective of this unit is to acquire and make available books and other items needed in the research work of the Center. The library's collection now contains 592 items. To facilitate the library's use, newsletters have been distributed to Center personnel, providing information and instructions about present and potential resources available in the library. Plans for a literature scanning and abstracting service and for a computerized catalog and KWIC have been set aside in favor of specific services related directly to individual projects. For example, there is being developed a collection of data-gathering instruments used in classroom observations of teacher and pupil behavior.

G. Unit on Application of Media and Materials (D. W. Allen)

The development and application of new media and materials to the purposes of the Center is the basic objective of this unit. The following facilities have been budgeted and are in various stages of development and integration into research activities: Learner Monitored Teaching Device (D. W. Allen), Analog Event Recorder (Joan E. Sieber), and a Pupilometer (R. Koff).

H. Unit on Film Production (D. W. Allen)

During the past year, a 16mm black-and-white film, "Teachers and Classes," was completed. This film, a joint venture with the Kettering Foundation-sponsored Microteaching Project, was designed as an aid to training procedures in classroom discipline. The film portrays classroom situations indicating discipline problems and a range of teacher responses to these situations. Representative situation titles are the following:

> "That isn't true", "What's the matter, Chris?" - "Stop that tapping" "Cheating" "Dirty Pictures."

During the Winter 1967 quarter, this film was used as part of the Center's Technical Skills Experiment Number 7, the results of which have not yet been analyzed.

The procedures employed in making this film are being used for a number of other film sequences developed wholly under Center auspices. Thus, a second film is intended to serve as a medium of teacher instruction on the topic of classroom interruptions of teaching. A series of incidents was filmed to present various interruptions and teaching techniques for dealing with them. Some of the interruption situations are illustrated by the following titles:

"Janitor's complaint," "Swearing," "Hand Raising," "Note Passing,"

A third film, dealing with small group instruction, is also in production. Preliminary material in the form of classroom incidents, has been filmed to present various teacher roles in developing small group discussions in the context of the standard classroom environment. Situations now filmed deal with such titles as:

"Backfence behavior" "Group horseplay" "All done already"
"Argument" "No leader yet"

These film materials will be used in the Center's project on small group instruction.

A fourth film, of 30 minutes duration, on microteaching is now in production. This film is scheduled to be completed in time for the Center-supported Microteaching Workshop in July 1967.

A slide film on the activities of the Center is also being prepared. This slide film will be used to portray the Center's activities to its visitors. Now being scripted, it may later be expanded into a motion picture.

The film unit is also planning for another summer's work on two films already mentioned, one on interruptions and another on small group techniques. It is anticipated that these films will be ready for release in the fall of 1967.

I. Unit on Publications (N. L. Gage)

This unit supervises the selection, editing, reproduction, and dissemination of the Center's publications. On November 17, 1966, the Center's Executive Committee adopted the following publication policy:

> "Materials may be approved for publication by the Editorial Board upon the recommendation of one or both Directors, or someone whom they may designate. No such recommendation shall be brought to the Editorial Board until the Directors have submitted the manuscript for review by a person competent to exercise professional judgment upon its content, and who is employed neither by Stanford nor by one of the Center's affiliated institutions.[1]

Under this policy, the Center has thus far published only two technical reports:

Technical Report No. 1 - "Practice-Centered Teacher Training - French"
by Robert L. Politzer

Technical Report No. 1A - "Performance Criteria for the French Language Teacher" by Robert L. Politzer

Because this policy seemed to be inhibiting the flow of publications from the Center's work, a new series of "Research Memoranda" was initiated in March 1967, in accordance with the following memorandum:

> "This is to initiate a series of 'SCRDT Research Memoranda.' You are invited to submit papers for this series. Such papers should be anything not yet published that you consider suitable for circulation within and outside the Center. The Center's regular publication policy -- requiring external review and approval by the Executive Committee serving as an Editorial Board -- will not operate with respect to these memoranda.
>
> The term 'Research Memoranda' should thus be interpreted broadly as including position papers, "think pieces," preliminary reports, incompletely polished (yet presentable) writings, as well as papers on empriical research ready for submission for publication. Papers presented at the recent AERA meetings, for example, should be eminently suitable for the Research Memorandum series."

Thus far, the following research memoranda have been prepared and are being disseminated:

Research Memorandum #1 - "Three Pressing Concerns of Educational Research"
by N. L. Gage

Research Memorandum #2 - "An Analytical Approach to Research on Instructional Methods" by N. L. Gage

Research Memorandum #3 - "Applying the Language of Behavioral Models to Teaching Acts" by F. J. McDonald

Research Memorandum #4 - 'Brunswikian Approaches to Research on Teaching"
by R. E. Snow

Research Memorandum #5 - "Response Complexity and Experimental Design"
by R. E. Snow

Research Memorandum #6 - "A Differentiated Teaching Staff"
by D. W. Allen

Much of the Center's work has not yet reached the stage of meriting publication as technical reports, but it seems likely that the number of such reports should become substantial during the coming year.

IV. Center Management and Administration

A. Current Organization of the Center.

The current organization of the Center is outlined in the "Guidelines for the Organization and Operation of the Center," as revised in January 1967 (attached as Appendix A), with the following exceptions:

1. The Advisory Committee has not yet been appointed, because of continuing consideration by the Co-Directors of the desirable structure and functions of such a committee. To assist in this consideration, the Co-Directors have conferred with Dr. Martin Trow, Professor of Sociology and Education at the University of California at Berkeley. As a result of this consultation, Dr. Trow has agreed to interview members of the Center's professional staff in an effort to gain insights into problems now existing in the Center's management and administration. It is expected that these interviews will contribute significantly to the formulation by the Co-Directors of a proposal to the Administrative Board during the spring of 1967 concerning the Center's Advisory Committee.

2. The Seminar has not been constituted as a single formal entity, as described in the "Guidelines." Instead, numerous informal seminars have been held on topics of special interest, with attendance open to all members of the Center, including research assistants. Questions have been raised by various senior staff members concerning the value of a formal, regular seminar such as that described in the "Guidelines." It was felt that such a seminar might become a distraction rather than a help in communication.

On the program and project level, the organization for the past year has consisted of three program areas: Instruction and Its Effects upon Students, Teaching Roles and Their Institutional Setting, and Services to the Center. Within each program area have been several projects (in the research and development areas), or units (in the service area). Each program area has had a director, and each project or unit has had a coordinator. The research and development structure of the Center has been reorganized into the three different substantive programs (behavioral, personological, and institutional), outlined in this report. The "Services" program area has been changed to one entitled "Facilities and Services," as described above.

B. Program Planning and Decision-Making Processes of the Center.

Program planning is mainly the responsibility of the Executive Committee. The Executive Committee has had several full-day sessions in recent months on the overall program of the Center; these meetings resulted in the reformulation of the Center's programs reported earlier.

The Executive Committee also functions at the project level. New projects must be approved by the Executive Committee before they are funded. The ongoing projects of the Center are reviewed quarterly or oftener by the Co-Directors using the advice of the Executive Committee to guide them in their recommendations on budget emphasis. The Administrative Board, meeting once a quarter, renders opinions and decisions on important policy matters, and reviews the budget submitted by the directors before its submission to the USOE.

At the level of individual projects, the project coordinators are given wide latitude to operate within the overall scope of their budgets, with the Directors of the Center keeping in touch with developments through periodic conferences.

C. Relations with Other Institutions and Programs.

1. School of Education. The Center enjoys cordial relations with other units of the university. Coordination with the School of Education is very close. One example of such coordination is that involving microteaching. The School of Education has been using microteaching since before the inception of the Center as a device for training teacher interns. Microteaching, with its small classes, short teaching time, concentration on one facet of teaching at a time, and preservation of significant behavior on videotape, provides a valuable avenue into research on certain facets of teaching. As a result, the Center has supported a portion of the cost of the microteaching program, and has received in return research opportunities that would be impossible to come by in other ways. Professors Dwight Allen, Robert Bush, and Frederick McDonald, all engaged in research in the Center, are also on the Secondary Education Committee of the School of Education, which supervises the operation of

the microteaching program. Also part of the School of Education, the School Mathematics Study Group, directed by Professor Edward Begle, has affiliated loosely with the Center, and future cooperation between the Center and SMSG is expected to increase.

2. Other Units of Stanford University. The Center also cooperates with other units of the university. Professor Pauline Sears, as indicated elsewhere in this report, is studying the effect of computer-assisted instruction upon those children who are being taught with CAI under Professor Patrick Suppes and Richard Atkinson at the Brentwood School. Presently being planned is a study of the effects of CAI on the teacher's role. It seems probable that this cooperation will become greater as the Center and the Brentwood project continue to develop.

3. Organizations Outside Stanford University. Elsewhere in this report, the development of the Center's field stations in the Fremont and Palo Alto school districts is reported. This cooperation should prove to be mutually beneficial, particularly when the teaching clinic idea is developed.

Our collaboration with the three California State Colleges in the area has not been as great as we would have liked. In part, the difficulty has been mechanical, in that the process of making subcontracts is a cumbersome one. In part, the difficulty has resulted from physical distance. A procedurally simple alternative to subcontracts is that of employing a member of a state college faculty to serve as a part-time research associate with the Center. This arrangement was made with Dr. Lois Nelson, an associate professor at San Francisco State College, during the fall semester of 1966. But the difficulty of attending two positions thirty miles apart resulted in discontinuation of the arrangement. The Executive Committee and the Administrative Board have both been examining better ways in which the Center can cooperate with the state colleges.

Cooperation with the California State Department of Education has been minimal. Dr. Paul Lawrence, of the State Department, has been a member of the Administrative Board of the Center since its inception, but has been unable to attend any of the meetings as yet. We intend to make further efforts to develop working relations with the State Department, and hope that these efforts will bear fruit in the future.

The Center has had a close relationship with the Far West Regional Laboratory for Educational Research and Development as it has evolved. Dr. Robert Bush, Co-Director of the Center, is a member of the Executive Panel of that laboratory and has met for two days each month with it. Recently, the Far West Laboratory has selected teacher education as its major mission. This decision has far-reaching consequences for future cooperation, in which the Center's role will concentrate more upon research, and the Laboratory's role will emphasize development and dissemination. The Laboratory and the Center are collaborating in the further development and dissemination of microteaching as an approach to in-service teacher education. Thus far, no cooperation has been arranged between the Center and other research and development centers. But there is frequent communication among the directors of the various centers, and research cooperation seems probable in the future. The Co-Directors and Professor Frederick McDonald recently visited the Learning Research and Development Center at the University of Pittsburgh. Similarly, there has been little cooperation as yet between the Center and the various supplementary education centers, although members of the Center's staff have served on various committees of these PACE centers. As the programs of the PACE centers become more crystallized, more cooperation can be expected.

D. Major problems Faced by the Center.

1. Faculty Time. The co-directors, and the other senior staff of the Center, have been concerned that some faculty members of the Center spend as little as 25% of their time on Center projects. The problem has arisen not from lack of willingness on the part of the faculty members to devote time to the Center, but because it has not been possible to release these individuals from teaching and other departmental duties in the School of Education. As a result of a Center policy recently approved by Dean H. Thomas James, however, all faculty members of the Center are being encouraged to work out a program that will enable them to devote at least 33% of their time to the Center in

any given academic quarter. Such an increase in the time devoted by some of the faculty members should significantly increase their contributions to the Center's work.

2. Staff Recruitment. One of the Center's greatest problems is that of recruiting qualified research and development associates. Two positions authorized in this year's budget have gone unfilled. Problems which increase the difficulty of recruiting are those of faculty status and tenure at the Center. Inquiries from and to researchers currently in faculty positions at other institutions have been fruitless because of our inability to offer faculty rank. Similarly, although we offer a three-year appointment contingent upon financing, the fact that we are financed for only one year at a time sometimes creates problems in recruiting. We have been able nevertheless to attract some excellent people who have been attracted by the opportunity to work with the senior staff of the Center. We have also been fortunate this year to have associated with the Center two U.S.O.E. postdoctoral research trainees, Drs. Daryll Dell and James Hogge, whose interests parallel those of the Center. Next year, we shall have two more, Drs. Bryce Hudgins and Roger Wilk, whose interests and competencies eminantly qualify them for collaboration in the Center's work.

As reported in the last quarterly report, the Center also faces the need to find a replacement for its Administrative Officer, Walter Garms, who is completing his doctorate and will be teaching at Teachers College, Columbia University, next fall.

3. Space. Aside from personnel, the major problem of the Center continues to be that of adequate research space in quarters close to the School of Education. The difficulties arising from space shortage and distance from the School of Education have been elaborated in other quarterly reports. It will be very difficult for the Center to function with adequate efficiency and effectiveness until these problems have been solved. In anticipation of the possibility that an invitation to apply for building funds might be received from the U. S. Office of Education, the Center has consulted Stanford's School Planning Laboratory, which is now preparing functional specifications for a Center building. The Center

has also conferred with the University's Planning Office, which has tentatively assigned a highly desirable site near the center of the campus and adjacent to the School of Education. The Center would be greatly strengthened by being able to occupy an especially designed building in this location.

V. Budget

(submitted separately)

VI. Requests for Contract Amendments

A. Quarterly Reports

We urge that the contract be amended to provide for semi-annual rather than quarterly reports. The burden of the quarterly report has taken directors and others from more important duties. Even if the quarterly report is brief, we seriously question the value of such frequent reporting, either to USOE or to ourselves.

B. Date of Budget Negotiation

We strongly suggest that budget negotiations be held in December, or at the latest in early January. In this way, the Center will be able to enter the professional job market and obtain competent researchers when they are available. These people generally look for jobs between January 1 and March 31; by the time we know whether we will have positions authorized, the individuals we want to fill them are no longer available.

VII. Signatures

This annual report and proposed budget are respectfully submitted by:

Robert N. Bush
Co-Director

N. L. Gage
Co-Director

Earl G. Cilley
Associate Research Administrator

Appendix A

School of Education
Stanford University

Stanford Center for Research and Development in Teaching

Guidelines for the Organization and Operation of the Center

Revised January, 1967

I. Introduction

The organization of the Center consists of the following major components:

A. Officers

B. The Administrative Board

C. Executive Committee

D. Advisory Committee

E. Evaluation Committee

F. Project and Operational Units

G. The Seminar

II. Composition of Each Component

A. Officers

The officers shall be the two Co-Directors and the Administrative Officer. The two Co-Directors shall be appointed by the Dean of the School of Education, with the approval of the U.S. Office of Education. The Administrative Officer shall be selected by the Co-Directors.

B. The Administrative Board

The Administrative Board shall consist of the Co-Directors, ex officio, three professors chosen from the faculty of the School of Education, one representative of the central administration of Stanford University, one representative of the faculty of Stanford University from outside the School of Education, three representatives from the colleges affiliated with the Center, one representative from the Public Schools affiliated with the Center, one representative from the State Department of Education, and the Dean of the School of Education and the Administrative Officer of the Center, both ex officio. Thus, the Administrative Board consists of ten appointed members plus four ex officio. The appointed members of the Administrative Board shall be designated annually in June by the Dean of the School of Education, in consultation with appropriate interested persons. The Administrative Board shall annually select its chairman.

C. The Executive Committee of the Center shall consist of the two Co-Directors, alternating as Chairman, and four appointed members of the Administrative Board, to be selected in a manner to be determined by the Board.

D. The Advisory Committee

The Advisory Committee shall consist of six representatives of affiliated colleges, six representatives of affiliated public school systems, two representatives of the State Department of Education, five representatives of Stanford University, chosen from the Central Administration and the faculty outside the School of Education, five members of the faculty of the School of Education, plus up to five members at large.

The members of the Advisory Committee and its Chairman shall be appointed for two-year terms, beginning on a staggered basis, by the Administrative Board.

E. The Evaluation Committee

The Evaluation Committee for the Center shall consist of members selected from the Visiting Committee of the School of Education of Stanford University. These members shall be chosen and appointed by the Visiting Committee and shall function as a sub-committee of the Visiting Committee.

F. Projects

The Projects shall consist of project directors and staff members, appointed by the Co-Directors. These persons will be drawn from the regular and temporary staff of the School of Education, other schools and departments of Stanford University, affiliated schools and colleges, and the State Department of Education, in terms of their interests and qualifications.

G. The Seminar

The Seminar shall consist of the Co-Directors, the Unit Heads and their professional associates, and other interested professional persons from Stanford University, the affiliated colleges and schools, the State Department of Education, and elsewhere. Temporary membership in the Seminar shall be open to other persons on invitation from any member of the professional staff of the Center, according to special interests and qualifications. Thus, the Seminar may be augmented, for the discussion of particular topics, by persons from academic departments concerned with teacher education and by other persons engaged in research and development in teaching.

III. Duties and Responsibilities of the Components

A. The Officers

1. The Co-Directors are responsible under the terms of the contract for supervising the work of the Center to assure that the terms and conditions of the contract are carried out. They shall initiate proposals for action on matters of program, policy (both program and operational), projects, and budget. The term "initiate" here signifies merely the formal aspect of initiation; the Center encourages informal initiative, in the form of suggestions and recommendations, by all persons concerned with the Center. The Co-Directors shall also implement the policies and actions relating to personnel, policies, projects, and budget by allocating personnel and funds, by making appointments (with the approval of the Executive Committee, the Dean, and other appropriate University officials, where necessary), and by formulating and controlling the budget. The Co-Directors shall prepare the periodic reports to the U.S. Office of Education, making use of the progress reports of the various project leaders. They shall perform any other functions not herein delegated to another group or individual. They may delegate such of their functions as may from time to time seem desirable, while continuing to retain the ultimate contractual responsibility mentioned above.

2. The Administrative Officer shall be responsible in the operation of the Center, for carrying out the duties assigned to him by the Co-Directors. He shall act as secretary to the Administrative Board and the Executive Committee.

B. The Administrative Board shall normally meet once each quarter. It shall establish general policies and program emphases and approve the budget to be submitted yearly to the U.S. Office of Education.

C. The Executive Committee of the Center, normally meeting weekly, shall advise the Officers on the day-by-day operation of the Center, assist in policy interpretation, and approve professional appointments.

D. The Advisory Committee, meeting semi-annually, shall review the policies and programs of the Center, make suggestions and recommendations to the Administrative Board concerning the strengthening or alteration of these policies and programs, and examine the direction of the Center's research and developmental work. The Advisory Committee shall receive the reports, or the essentials of these, as submitted by the Co-Directors to the U.S. Office of Education.

E. The Evaluation Committee, meeting annually, shall review all aspects of the operation of the Center and report its evaluation to the Dean of the School of Education and the President of Stanford University. The Evaluation Committee shall receive copies of the periodic reports submitted to the U.S. Office of Education.

F. The Projects shall be responsible for the research and development and operational duties assigned to them. The persons assigned to these projects shall meet and collaborate at such times and in such ways as are appropriate to their tasks. The project director of each shall submit written reports to the Co-Directors as needed for the preparation of reports to the U.S. Office of Education.

G. The Seminar, meeting bi-weekly, shall be the principal device for maintaining communication and developing a common viewpoint within the Center. It shall be concerned primarily with the substantive aspects (theory, methodology, interpretation, and application) of the Center's work rather than with administrative, personnel, operational, or budgetary matters. The intellectual give-and-take of the Seminar should be aimed at the try-out of ideas, the criticism of approaches, and the appraisal of the educational applicability and feasibility of innovations in teaching and teacher education.

STANFORD CENTER FOR RESEARCH AND DEVELOPMENT IN TEACHING

Personnel of the Center

Dean, School of Education
H. Thomas James

Co-Directors
Robert N. Bush
Nathaniel L. Gage

Administrative Officer
Walter I. Garms

Research & Development Associates
Dwight W. Allen
Edward G. Begle
Norman J. Boyan
Lee J. Cronbach
Richard E. Gross
Robert W. Heath
Robert H. Koff
Frederick J. McDonald
Robert L. Politzer
Pauline S. Sears
Fannie R. Shaftel
Joan E. Sieber
Richard E. Snow
G. Wesley Sowards
Richard L. Warren

Administrative Board

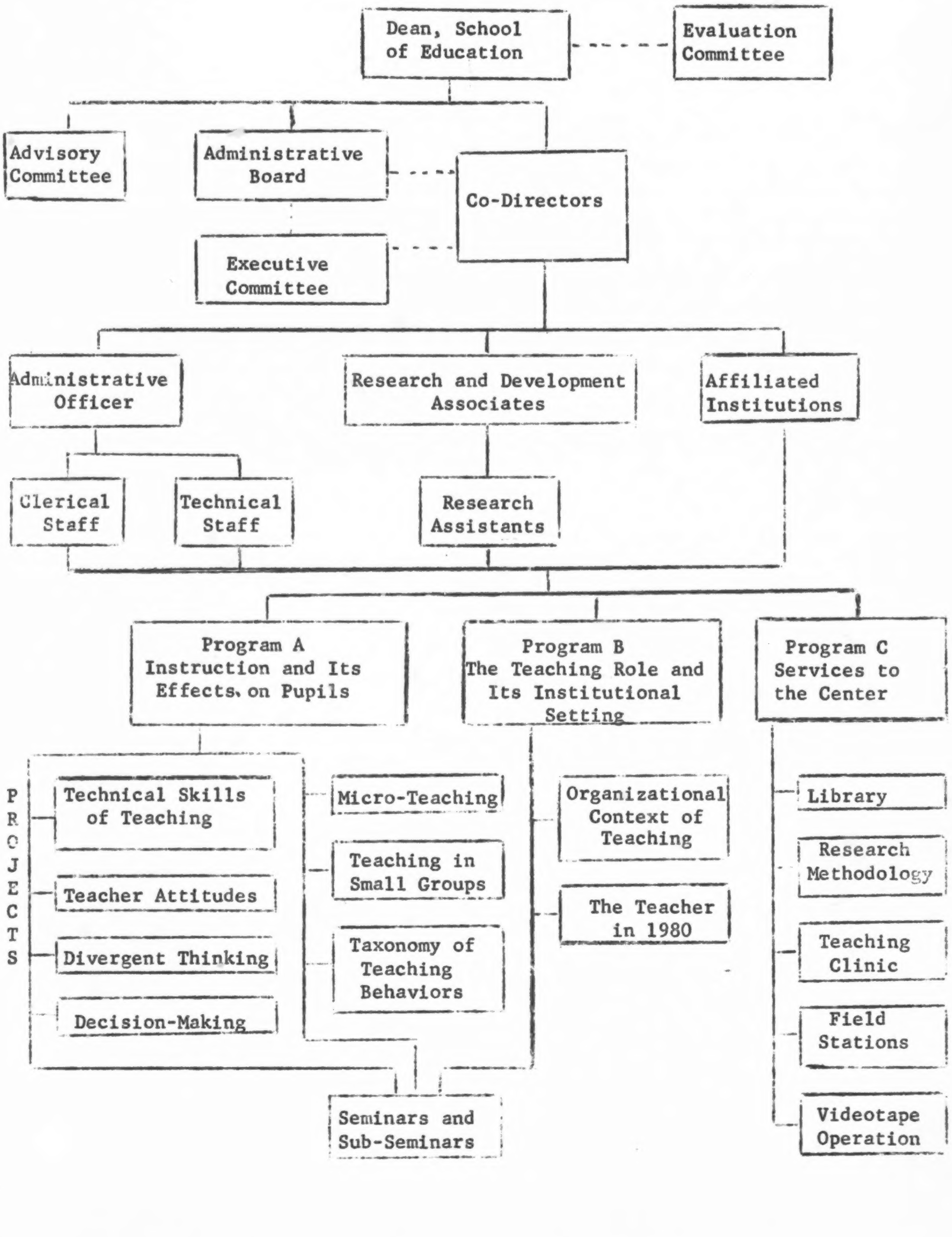
Harold Santee, Superintendent, Palo Alto Unified School District
James W. Brown, Dean, Graduate Division, San Jose State College
Lewie Burnett, Dean, Division of Education, California State College at Hayward
Bernard McKenna, Associate Dean, Division of Education, San Francisco State College
Paul Lawrence, Associate Superintendent of Public Instruction, State of California
Robert M. Rosenzweig, Associate Dean, Graduate Division, Stanford
Ernest R. Hilgard, Professor of Psychology and Education, Stanford
Dwight W. Allen, Associate Professor of Education, Stanford
Norman J. Boyan, Associate Professor of Education, Stanford
Lee J. Cronbach, Professor of Education and Psychology, Stanford

Ex-Officio:
H. Thomas James
Robert N. Bush
Nathaniel L. Gage
Walter I. Garms

Executive Committee
Dwight W. Allen
James W. Brown
Norman J. Boyan
Robert N. Bush
Lew J. Cronbach
Nathaniel L. Gage

STANFORD CENTER FOR RESEARCH AND DEVELOPMENT IN TEACHING

Organization Chart


Dean, School of Education
Evaluation Committee
Advisory Committee
Administrative Board
Co-Directors
Executive Committee
Administrative Officer
Research and Development Associates
Affiliated Institutions
Clerical Staff
Technical Staff
Research Assistants
Program A Instruction and Its Effects on Pupils
Program B The Teaching Role and Its Institutional Setting
Program C Services to the Center
PROJECTS
Technical Skills of Teaching
Teacher Attitudes
Divergent Thinking
Decision-Making
Micro-Teaching
Teaching in Small Groups
Taxonomy of Teaching Behaviors
Organizational Context of Teaching
The Teacher in 1980
Library
Research Methodology
Teaching Clinic
Field Stations
Videotape Operation
Seminars and Sub-Seminars